

THE GENUS LEPIDIUM IN THE UNITED STATES

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Thellung's Monograph of *Lepidium*,¹ published in 1906, is the most recent comprehensive treatment of that interesting genus of the Cruciferae. Since that date sixteen species and varieties of *Lepidium* have been described as new for the United States, but many of these, unfortunately, are of no nomenclatural value. In attempting to use Thellung's Monograph, one is convinced that the material which was at that worker's disposal was inadequate for an accurate interpretation of our plants. In fact, Thellung was forced to recognize several of our species without having seen any material which he could refer to them.

It was at the instigation of several American taxonomists, who were unanimous in their opinion that *Lepidium* needed revision, that the present study was undertaken. It is hoped that it will be possible to extend the study of the genus to the South American species in the near future, as the exact status of some of our introduced plants cannot be ascertained until this is done.

The herbaria which have been visited or from which material has been borrowed for study are cited by the following abbreviations in this paper: University of California, Berkeley (C), California Academy of Sciences (CA), Carnegie Institution of Washington at Stanford University (CI), herbarium of Joseph Ewan, Berkeley (E), Field Museum (F), Gray Herbarium (G), University of Illinois (I), herbarium of Louis Wheeler, La Verne, California (LW), University of Montana (M), Missouri Botanical Garden (MBG), New England Botanical Society (NE), New York Botanical Garden (NY), Pomona College (P), Philadelphia Academy of Sciences (PA), Dudley Herbarium, Stanford University (S), United States National Herbarium (US), Rocky Mountain Herbarium, University of Wyoming (W), Washington State College (WSC). The caption "representative material" indicates that only a certain number of the specimens examined by the writer are cited; "material seen" indicates that all specimens examined are cited.

To the curators of these herbaria my thanks are due and gladly given. It is a pleasure to acknowledge the help I have received from Dr. P. A. Munz of Pomona College and from Miss Nell Horner, Librarian of the Missouri Botanical Garden, for the loan of literature; from Dr. Harold St. John of the Bishop Museum who supplied notes and photographs made at Paris from the types of Desvaux; and particularly from Mr. J. T. Howell of the California Academy of Sciences who was kind enough to make observations on the type of *L. Menziesii* at the British Museum and who has supplied much valuable information con-

¹ Denks. Schweiz. Gesell. Naturwiss. 41, abh. 1: 1-340. 1906. Herein cited as 'Monog. Lepid.'

cerning the literature and the field characters of several of the far-western species.

LEPIDIUM L.

Lepidium L. Sp. Pl. 643. 1753, Gen. Pl. 291. 1754; Thell. Monog. Lepid. 72. 1906.

Sprengeria Greene, Leaflets Bot. Obs. and Crit. 1: 198. 1906.

Leaves entire to bi- or tripinnate, sometimes clasping or even perfoliate. Pedicels terete to winged or much flattened. Sepals usually somewhat pubescent on back. Petals lacking, or mere vestiges, or as much as 2-3 mm. long, white to sulfur yellow, glabrous or rarely densely pubescent on back. Stamens 2, 4, or 6. Silicles rotund, ovate, elliptic, obovate, or oblong-ovate, prominently reticulate to smooth, hirsute to glabrous, apex from scarcely winged and barely notched to winged and deeply notched, the apices often divergent; style lacking to as much as 3 mm. long. Seeds 2, cotyledons incumbent to accumbent, entire or bi- or trifold. Low annuals to somewhat suffrutescent perennials, glabrous to hirsute with simple hairs.

KEY TO SPECIES OF LEPIDIUM

- Woody-based perennials, or if annuals styles at least 0.3 mm. long, exceeding notch of fruits; if styles shorter, upper cauline leaves perfoliate, or with sagittate or auriculate clasping bases.
- Leaves (at least some of the cauline ones) either perfoliate, or entire and with clasping bases.
- Cauline leaves perfoliate; fruits rhombic-ovate, not greatly inflated 2. *L. perfoliatum*
- Cauline leaves sagittate-based; fruits conspicuously inflated.
- Perennial; fruits without conspicuously winged margin and apex 4. *L. Draba*
- Annual; fruits with conspicuously winged margin and apex 1. *L. campestre*
- Leaves neither perfoliate nor entire and sagittate-clasping.
- Fruits with prominent divergent winged apices; style one-third as long to as long as fruit; petals yellow. 20. *L. flavum*
- Fruits, styles, and petals not as above.
- Plants glabrous and glaucous; fruits 4-7 mm. broad 21. *L. Fremontii*
- Plants usually pubescent and not glaucous; fruits less than 4 mm. broad.
- Annual; petals yellow 24. *L. Jaredii*
- Annuals, biennials, or perennials, (if annuals the petals white).
- Plants densely hirsute-cinereous or papillose-hirsute; cauline leaves pinnatifid; annuals (biennials?) 25. *L. Thurberii*
- Plants not cinereous-hirsute, or if so, cauline leaves practically or quite entire; biennials or perennials.
- Caespitose and matted, 3-6 cm. tall 23. *L. nanum*

- Erect or at least not caespitose and matted; usually over 6 cm. tall.
- Leaves entire or at most but dentate, some, at least, 4-8 cm. broad; fruits somewhat pilose 5. *L. latifolium*
- Leaves pinnate to entire, but if entire, not so broad as above; fruits not pilose. Silicles emarginate; style 0.3 mm. long or more 22. *L. montanum*
- Silicles not emarginate; style usually less than 0.3 mm. long 6. *L. graminifolium*
- Annuals or perennials, but never woody-based; styles less than 0.3 mm. long, usually shorter than notch of fruit; upper cauline leaves neither perfoliate nor auriculate-based and clasping.
- Fruits 1.5-2.2 mm. long; cauline leaves finely pinnatifid or pinnate-pinnatifid, granular puberulent 13. *L. sordidum*
- Fruits over 2.2 mm. long, if fruits 2.2 mm. long or less, leaves not finely pinnatifid and plant not granular-puberulent.
- Petals 2 mm. or more long; fruits 5-7 mm. long, apices long-acuminate, winged; if apices otherwise, the cotyledons bi- or trifold.
- Cotyledons bi- or trifold; fruits not with acuminate apices, glabrous 3. *L. sativum*
- Cotyledons entire; fruits with long acuminate apices, pubescent 19. *L. latipes*
- Petals less than 2 mm. long usually; if petals 2 mm. long or over, fruits less than 5 mm. long; if fruits 5 mm. long or more then apices not acuminate winged and cotyledons not bi- or trifold.
- Stems glabrous or nearly so; cauline leaves 1-4 cm. broad, entire or at most dentate 5. *L. latifolium*
- Stems pubescent or cauline leaves less than 1 cm. broad, or both.
- Sepals persistent until fruits are nearly mature; pedicels slightly flattened and wing-margined.
- Fruits oval to obovate with rounded apex and sinus, not prominently reticulate 8. *L. oblongum*
- Fruits ovate, prominently reticulate, apex with two acute winged divergent teeth 7. *L. pubescens*
- Sepals deciduous along with petals and stamens or soon after; pedicels often decidedly flattened, but scarcely wing-margined.
- Fruits emarginate and with prominent, acute, divergent apices, or fruits prominently reticulate, or both.
- Pedicels slender, not greatly flattened, some, at least, equal to or longer than fruits; silicles glabrous 18. *L. oxycarpum*
- Pedicels much flattened, not longer than fruits; silicles often pubescent.
- Silicles glabrous 16. *L. nitidum*
- Silicles pubescent 17. *L. dictyotum*
- Fruits not emarginate, or if so, the lobes on either side of sinus neither acute nor divergent; fruits not prominently reticulate.
- Pedicels much flattened, about twice as broad as thick or broader.

- Silicles glabrous.
- Winged margins of fruits broad, slightly upturned usually; segments of leaves linear; stamens usually six 16. *L. nitidum*
- Winged margins of fruits narrow and not upturned; leaf-segments not truly linear; stamens mostly less than six.
- Plants short-hirsute to hirsute-hispid. 15. *L. lasiocarpum*
- Plants with softer pubescence than above.
- Leaves prevailing deeply lobed to pinnatifid 8. *L. oblongum*
- Leaves more entire than above 11. *L. densiflorum*
- Silicles pubescent.
- Margin of fruit upturned, upper surface concave 16. *L. nitidum*
- Margin of fruit not upturned, upper surface plain or convex.
- Pubescence somewhat appressed; lower cauline leaves lobed or sinuate only, at least 7 mm. broad 14. *L. austrinum*
- Pubescence scarcely appressed; cauline leaves mostly more deeply divided and less than 7 mm. broad.
- Leaves prevailing deeply lobed to pinnatifid; pubescence neither hirsute-hispid nor hispid 8. *L. oblongum*
- Cauline leaves, at least, usually more entire, but if deeply lobed or pinnatifid, the plant hirsute or hispid 15. *L. lasiocarpum*
- Pedicels not strongly flattened, not twice so broad as thick.
- Cauline leaves prevailing deeply cleft to pinnatifid 8. *L. oblongum*
- Cauline leaves mostly entire, the lower sometimes pinnatifid or deeply cleft, the upper more nearly entire.
- Plant hirsute; basal leaves entire or but-toothed; fruits hirsute, the hairs somewhat appressed 14. *L. austrinum*
- Plant not hirsute; basal leaves usually pinnatifid or at least cleft.
- Cotyledons accumbent or at least oblique, if oblique the petals exceeding the sepals 12. *L. virginicum*
- Cotyledons incumbent, or if oblique, the petals lacking or shorter than sepals.
- Fruits obovate or oblong-obovate in outline, the upper half averaging greater in width than the lower half.
- Silicles nearly elliptic, narrowed to acute apex; congested in numerous axillary reduced racemes as well as in terminal racemes 2-4 cm. long (see also *L. ruderale*). 10. *L. ramosissimum*

- Silicles oblong to obovate but not elliptic in outline, rounded at apex, borne in racemes over 4 cm. long, normally 11. *L. densiflorum*
- Fruits ovate to oval in outline, upper half averaging less than lower half in width, or but equal to it.
- Perennial; fruits not emarginate. Annuals or biennials; fruits emarginate. 6. *L. graminifolium*
- Fruits ovate-elliptic to elliptic; cotyledons always incumbent; plants often malodorous.
- Racemes numerous, compounded, short, 1-4 cm. long 10. *L. ramosissimum*
- Racemes terminal, not compounded, mostly over 4 cm. long 9. *L. ruderale*
- Fruits oval to nearly rotund; cotyledons mostly accumbent or oblique (except in var. *medium* f. *pusillum*); plants not malodorous 12. *L. virginicum*

1. LEPIDIUM CAMPESTRE (L.) R. Br. in Ait. Hort. Kew, ed. 2, 4: 88. 1812.

Thlaspi campestre L. Sp. Pl. 646. 1753.

Annual, densely short-villose, simple to profusely branched; leaves oblanceolate, the basal 4-12 cm. long, *ca.* 1 cm. broad, pinnatifid, lyrate-lyobed to entire, petiolate; cauline denticulate, sessile and sagittately clasping; pedicels slender, slightly flattened, about equal to fruits; sepals *ca.* 1.5 mm. long, villose to glabrate; petals nearly 2 mm. long; stamens 6; fruits oblong-ovate, 5-6 mm. long, 4 mm. broad, pustulose and somewhat hairy to glabrous, margins and apex fairly broadly winged, upper surface concave, apex slightly emarginate; style 0.2-0.6 mm. long, equaling or slightly exceeding the apices; cotyledons incumbent. (Plate XVII, fig. 5.)

An introduced European species well established, especially on waste land, throughout the United States, except in most of the Rocky Mountain States.

Representative material. MASSACHUSETTS: Harwich, Barnstable County, *Fernald & Long 18493* (G). WEST VIRGINIA: Mount Crawford, *Heller 820* (MBG, etc.). MISSOURI: Fredericktown, *Palmer 30295* (MBG, etc.). COLORADO: Mesa Verde Park, *Goodman & Hitchcock 1363* (C, CA, MBG, S). NEVADA: Lemmon Valley, Washoe County, *Kennedy 2086* (CA, S). WASHINGTON: near Bingen, *Suksdorf 11662* (CA, MBG, PA, S, WSC).

2. LEPIDIUM PERFOLIATUM L. Sp. Pl. 643. 1753.

Annual; basal leaves multifid or multipinnate, cinereous-pubescent to glabrous, cauline leaves variable, lowest finely dis-

sected, middle auriculate, surrounding stem, glabrous or nearly so, upper perfoliate, rounded, glabrous; pedicels slender, terete, glabrous, longer than fruits; sepals ovate, *ca.* 1 mm. long, pilose on back; petals narrow, slightly exceeding sepals; stamens usually 6; silicles rhombic-ovate, *ca.* 4 mm. long and nearly as broad, glabrous or minutely and sparsely pubescent, barely winged at apex, sinus *ca.* 0.2 mm. deep; style about equal to sinus; cotyledons incumbent. (Plate XV, fig. 2.)

A well established European species; very common, especially in central and western United States, chiefly on waste land.

Representative material. MAINE: Portland, *Fernald, Long & Norton 13689* (NE). UTAH: north of Salt Lake City, *Rydberg 6125* (US, W). NEVADA: Pyramid Lake, Washoe County, *Kennedy 2039* (CA, G, W). IDAHO: Lewiston, *Hitchcock & Samuel 2497* (CA, M, P, PA, S, W, WSC). CALIFORNIA: Keddie, Plumas County, *Eastwood 14713* (CA).

3. LEPIDIUM SATIVUM L. Sp. Pl. 644. 1753.

Strict, tall annual; leaves all dissected, pubescent; pedicels appressed, not so long as fruits; sepals pilose on back, slightly over 1 mm. long; petals nearly twice length of sepals; stamens 6; fruits oblong-ovate, 5–6 mm. long, *ca.* 4 mm. broad, glabrous and more or less glaucous, winged and upturned on side and at apex, sinus *ca.* 0.4 mm. deep; style about half equaling sinus; cotyledons bi- or trifid, incumbent. (Plate XIV, fig. 1.)

Occasionally escaped from gardens or introduced on ballast, apparently not becoming established.

Representative material. MAINE: Aroostook County, *Furbish* in 1880 (NE). CONNECTICUT: Easton, *Eames 3387* (G). MASSACHUSETTS: New Bedford, *Hervey* (NE). RHODE ISLAND: Middletown, Newport County, *Simmonds* (NE). WASHINGTON: Bingen, Klickitat County, *Suksdorf 8355* (WSC). OREGON: ballast, Portland, *Suksdorf 1844* (WSC); Clearwater, *Spalding* (G). CALIFORNIA: near Piedmont, Oakland, Alameda County, *Rattan* in 1881 (S).

4. LEPIDIUM DRABA L. Sp. Pl. 645. 1753.

Sparsely pubescent to densely cinereous perennial often with repent stems; leaves oblong to oblong-ob lanceolate or oblong-obovate, denticulate to dentate, lower 4–10 cm. long, 2–5 cm. broad, long-petioled, upper sessile and with large clasping bases; pedicels slender, terete, *ca.* 1 cm. long; sepals 1.5–2 mm. long; petals 3–4 mm. long, clawed, fruits triangular-ovate to ovate, much inflated, 3–5 mm. long, 4–6 mm. broad, glabrous,² barely refuse; style *ca.* 1 mm. long; cotyledons incumbent; ovules sometimes two in each cell. (Plate XVI, fig. 6.)

An introduced European species now well established in western United States where it is a troublesome weed in some regions; less common in eastern United States.

Representative material. CONNECTICUT: New Milford, *Weatherby 5287* (G, NE). COLORADO: Naturita, Montrose County, *Payson & Payson 3377* (G,

² Easily confused with *Hymenophysa pubescens* C. A. Meyer, which has very pubescent fruits that are not at all cordate at base.

MBG, W). IDAHO: north Blaine County, *Macbride & Payson 3083* (CA, G, MBG, P, W). WASHINGTON: 10 miles north of Dodge, Garfield County, *Hitchcock, Samuel, & Crisafulli 2592* (CA, M, P, PA, S, W, WSC). CALIFORNIA: near Yreka, Siskiyou County, *Greene 783* (G, MBG), *Heller 8006* (G); Santa Cruz Island, *Howell 6241* (CA).

Although there is great variation in the material seen, the writer has been unable to delimit varieties in this species. Specimens of the nature of the plants which have been called *L. repens* or *L. Draba* var. *repens* have been seen, but because of the fact that there is every degree of variation from the more common small silicles to the large inflated fruits characteristic of var. *repens*, the latter plants are not being given any particular recognition. The following collections are typical of what has been known as var. *repens*. CALIFORNIA: West Sacramento, Tiger Inn, *Bellue* in 1932 (CA, S, US), fruits greatly inflated; near Westminster, Orange County, *Johnson* (P). WASHINGTON: Yakima, *Nelson 1142* (US). SOUTH DAKOTA: Vermilion, Clay County, *Over 17229* (US).

5. *LEPIDIUM LATIFOLIUM* L. Sp. Pl. 644. 1753; Morse, *Rhodora* 26: 197. 1924; Eames, *Rhodora* 37: 161. 1935.

L. latifolium L. var. *eu-latifolium* Thell. Monog. Lepid. 160. 1906.

Tall perennial from widely spreading underground root system, glabrous or nearly so; leaves all entire to dentate, basal as much as 30 cm. long and 6-8 cm. broad, with petioles nearly equalling blades, cauline leaves reduced but many of them 1-4 cm. broad, upper nearly sessile; racemes numerous, many-flowered, much-compounded; pedicels slender, terete, much longer than fruits; sepals oval, less than 1 mm. long, somewhat pilose on back; petals spatulate, white, ca. 1.5 mm. long; stamens 6; silicles ovate-rotund, sparsely pilose, ca. 2 mm. long, not emarginate (or but very minutely so), tipped by stigma and almost obsolete style. (Plate XV, fig. 5.)

Introduced along the coast in New England in saline soil. Well established in parts of Mexico.

Material seen. MASSACHUSETTS: Peabody, *Morse* in 1924 (G, NE, PA, US). CONNECTICUT: tidal shore, Darien, *Eames 11626* (G), *Eames 11633* (WSC); Noroton Point, *Griscom 21882* (G, NE).

A collection from Smeltzer, Orange County, California, *Erwan 4759*, collected in July, 1931 (E, LW, M, P), is extremely puzzling. Although the collector thought that it was an annual, he was not sure, nor can one decide this point from the collection. The silicles are pilose, elliptic-oval, and about the size of those of *L. latifolium*. Leaves and also flowers are almost lacking, the plant being very heavily loaded with ripe fruits. On the basis of fruit characters the plant should be called *L. latifolium*, but if

it is an annual and had no broader leaves than the few on the specimen, it is probably either *L. ruderale* or some hitherto unreported introduced species.

6. *LEPIDIUM GRAMINIFOLIUM* L. Syst. Nat. ed. 10, 2: 1127. 1759.

Perennial, 3–7 dm. tall, sparsely pubescent; basal leaves dentate or crenate-dentate, mostly spatulate, 2–6 cm. long, *ca.* 1 cm. broad, long-petioled, cauline linear to oblanceolate, mostly entire or some remotely denticulate, 1–3 cm. long, 0.1–0.4 cm. broad; racemes loosely flowered, 2–6 cm. long; pedicels slender, ascending, about equal to fruits, not flattened; sepals *ca.* 1 mm. long, pubescent on back; petals spatulate-obovate, *ca.* 2 mm. long; stamens 6; fruits ovate-elliptic, glabrous, 3–4 mm. long, apex acute, not emarginate, tipped by distinct though very short (*ca.* 0.2 mm. long) style and stigma. (Plate XVII, fig. 3.)

Introduced along the coast occasionally on ballast, but not established in the United States.

Material seen. NEW JERSEY: ballast, near Communipau Ferry, *Brown* in 1879 (G); Camden, *Martindale* in 1880 (PA), *Albrecht* in 1898 (PA). PENNSYLVANIA: piers 82 and 825, Philadelphia, *Meredith* in 1920 (PA). OREGON: ballast, Linnton, *Nelson 503* (G).

The fruits of the species are most like those of *L. ruderale* in shape, but they are not emarginate, and the style and stigma are plainly visible.

7. *LEPIDIUM PUBESCENS* Desv. Journ. Bot. 3: 165, 180. 1814.

L. reticulatum Howell, Fl. Northwest Amer. 1¹: 64. 1897.

This is the only representative of this group from southwestern Oregon.

L. oxycarpum var. (?) *strictum* Wats. Bot. Calif. 1: 46. 1876.

The type, collected by Rattan, near Placerville, California, is good representative material.

L. strictum Rattan, Anal. Key 25. 1888.

Pubescent annual, spreading to erect, branches 5–20 cm. long; leaves bipinnatifid to laciniately lobed, the divisions linear, not over 2–3 mm. broad, the basal 3–7 cm. long, 1–2 cm. broad, glabrous or with few hairs chiefly on petioles; racemes crowded, seldom over 4–5 cm. long; pedicels scarcely as long as fruits, erect, or but slightly spreading, somewhat flattened and with winged margins, lower surface glabrous or nearly so; sepals slightly less than 1 mm. long, often purplish, pilose on back, persistent until fruit is nearly mature; petals minute; stamens 2; silicles ovate to ovate-rotund, 2.25–3 mm. long, nearly as broad, distinctly reticulate, glabrous or the margin with few short hairs, biconvex, thickest portion just above center of fruit, with small winged apex, the sinus open and the two teeth slightly spread-

ing, *ca.* one-sixth length of whole fruit; style lacking; cotyledons incumbent. (Plate XIV, fig. 3.)

An introduced South American species, fairly widespread in California; at Portland and in southern Oregon; collected once in Utah.

Representative material. UTAH: Castle Gate, Carbon County, *Grant* in 1900 (S). OREGON: Woodville, *Howell* in 1889 (MBG), *Howell 1909* (NY); Umpqua Valley, *Howell* in 1881 (NY). One of these last three collections is probably the type collection of *L. reticulatum* Howell. CALIFORNIA: without locality, *Rattan* in 1878 (NY); Hoopa Valley, Humboldt County, *Rattan* in 1878 (G); Potter Valley, Mendocino County, *Eastwood* in 1925 (CA); Sycamore Slough, Colusa County, *Ferris 695* (NY); Kelseyville, Lake County, *Blankinship* in 1929 (MBG); Petaluma, *Congdon 300* (G); near Napa, *Heller & Brown 5363* (F, G, MBG, NY, P, PA, S, W); near Placerville, *Rattan* (G, type of *L. oxycarpum* var. *strictum*); Kentfield, Marin County, *Eastwood 18* (CA, F, NY, US); San Francisco, *Jones 3272* (CA, F, MBG, NY, P, S); Stanford University, *Abrams 1648* (MBG); Pacific Grove, *Heller 6633* (F, G, MBG, NY, PA, S); Visalia, *Congdon 461* (G); Glennville, Kern County, *Howell 5145* (CA); Santa Catalina Island, *Trask* in 1901 (NY); Los Angeles, *Chamberlain* (NY). The two following collections are tentatively placed here: the fruits are much less reticulate than usual, are not truly biconvex, and the apices are not divergent, but otherwise they are fairly similar to those of the above plants; the sepals are persistent, the leaves are similar, and the pedicels are wing-margined: Portland, Oregon, *Suksdorf 3193, 3235* (WSC).

The species name *pubescens* is being used provisionally for this entity chiefly because that is the name in common usage since Thellung's Monograph. However, judging from notes made at Paris by Dr. Harold St. John, and from the excellent photograph he sent me of Desvaux's type, I feel fairly certain that our species, although undoubtedly introduced from South America, is not the same as *L. pubescens* Desvaux.

8. LEPIDIUM OBLONGUM Small, Fl. Southeastern U. S. 468, 1331. 1903.

L. reticulatum Thell. Monog. Lepid. 196. 1906. Not *L. reticulatum* Howell.

L. Greenei Thell. Monog. Lepid. 253. 1906 (footnote).

Annual, much branched, diffuse to ascending, 5–20 cm. tall, hirtellous to villose-hirsute; leaves pinnatifid to laciniately cleft or lobed, the basal ones about 3 cm. long, nearly 1 cm. broad, with lobed pinnae, cauline ones smaller, laciniate only, the central rachis as much as 3–4 mm. broad; racemes numerous, 6–9 cm. long; pedicels scarcely as long as fruits, ascending to spreading, flattened somewhat, but scarcely wing-margined; sepals slightly more than 1 mm. long, persistent only for a short time after flowering; petals wanting or but linear vestiges; stamens 2; silicles glabrous or sparsely short-pectinate, oval to oblong-ovate, 2.5–3.5 mm. long and 2–3 mm. broad, indistinctly reticulate, narrow winged margin sometimes slightly upturned, apices rounded except for small v-shaped sinus one-sixth to one-eighth

the length of the whole fruit; stigma sessile or essentially so; cotyledons incumbent. (Plate XIV, fig. 4.)

Collected at widely scattered stations: Oklahoma, Arkansas, Texas, southern Arizona, southern and central California, Mexico; probably a native of South America.

Representative material. ARKANSAS: Corning, *Letterman* in 1884 (G, MBG); Hope, *Letterman* in 1884 (MBG); Texarkana, *Pringle* in 1883 (F, NY). OKLAHOMA: Ingersoll, *Bush 1505* (MBG, NY); near Alva, *Stevens 3008* (G, MBG, S, US); Sapulpa, *Bush 1163* (MBG, NY type); Huntsville, *Blankinship* in 1896 (G). TEXAS: Comanche, *Eggert* in 1900 (MBG); Sweetwater, *Palmer 13708* (MBG, US); near Lubbock, *Demaree 7442* (MBG), *Studhalter 1115*, silicles pubescent (US); Canyon, *Palmer 14011* (MBG, US). ARIZONA: Picture Rocks, Pima County, *Bartram 104* (PA, W); Santa Rita Mountains, *Griffiths 2186* (NY); Sacaton, *Peebles 704* (US). CALIFORNIA: Shattuck Avenue, Berkeley, *Davy* in 1900 (C); Del Mar, San Diego County, *Brandege* in 1894 (C).

In general, there seems to be some difference between the material from Arizona and the more eastern states and that of southern California. The fruits of the California plants are somewhat larger and pubescent on the margins (of the above collections from other states only *Studhalter 1115* has pubescent silicles), the leaf-divisions are somewhat narrower, and there seems to be less tendency for the sepals to be persistent. They were at first thought to be more closely related to *L. lasiocarpum* than to the other plants which Small called *L. oblongum*, and much of the material examined was annotated as a new variety of *L. lasiocarpum*. However, as more material has been studied, the similarity between the plants from the two regions has become more obvious and the collections mentioned below are therefore somewhat hesitantly referred here.

Representative material. CALIFORNIA: San Bernardino, *Parish 4628* (NY, S, US), *Parish & Parish 64* (MBG); Fairmount Park, Riverside County, *Wilder* in 1908 (C); El Centro, *McGregor 2012* (P); near San Luis Obispo, *Roadhouse 382* (US); San Nicolas Island, *Trask 28* (G, MBG), *Howell 8208* (CA); San Miguel Island, *Munz & Voss 11878* (P); Santa Cruz Island, *Hoffmann* in 1930 (CA); Santa Catalina Island, *Trask* in 1901 (MBG); Los Angeles, *Brewer 27* (G); Santiago Creek, Orange County, *Geis* in 1902 (P); San Diego, *Pringle* in 1882 (F, G, MBG, NY), *Orcutt* in 1884 (US), *Jones 3050*, first number cited by Thellung under *L. Robinsonii* (CA one sheet only, P, but not second sheet at CA, nor sheets at I, MBG, NY, US, WSC), *Jones 3051* (CA, MBG, NY one sheet only, P, PA, US); Sweetwater, *Orcutt 1038* (F, MBG); Ramona, *Brandege* in 1906 (G).

Although it is fairly certain that this is a South American species which has been introduced into Mexico and the United States, I have been unable to determine with certainty the correct name for the material. It seems probable that it is either *L. auriculatum* Regel and Körnicke or *L. bipinnatifidum* Desv. Dr. Harold St. John, who compared material of this species from Arkansas and from southern California with the type of *L. bipinnatifidum* at Paris, ventured the opinion that they are not con-

specific. Judging from his notes and photograph of Desvaux's type, I am prone to agree with him. However, until such time as this problem can be solved, it seems best to use the oldest North American name for the species. Since these are not the plants which Howell had in mind when he described *L. reticulatum*, the name here used is *Lepidium oblongum*.

Lepidium Greenei, a name which Thellung proposed for the plants he was calling *L. reticulatum* if that species proved not to be the same as Howell's species, must be relegated to synonymy. Thellung's confusion on this point resulted, of course, from the fact that he did not see type material of either *L. reticulatum* or *L. oblongum*.

The group may be distinguished from *L. pubescens* by the less divided leaves, by the non-winged pedicels, and by the fruits, which are neither biconvex nor so prominently reticulate and which are oval to obovate, rather than ovate.

9. LEPIDIUM RUDERALE L. Sp. Pl. 645. 1753.

L. texanum Buckley, Proc. Am. Acad. Sci. Phila. 1861: 449. 1862. The type was collected by Buckley, near Fort Mason, Texas, June, 1861.

Foetid, freely branched, minutely pubescent annual (biennial?) 1.5-5 dm. tall; basal leaves pinnatifid to bipinnatifid, lower cauline somewhat divided, upper linear and entire; racemes mostly 5-8 cm. long, open, not compounded or leafy; pedicels equaling or slightly exceeding fruits, usually slightly ascending, terete; sepals *ca.* 1 mm. long, linear, 3-4 times as long as broad, pubescent on back; petals lacking entirely (in specimens examined); stamens 2; silicles glabrous usually, 2-3 mm. long and *ca.* two-thirds as broad, ovate-elliptic to nearly oval, shallowly notched at apex, the sinus rather open, one-sixth to one-tenth length of fruit; style lacking; cotyledons incumbent. (Plate XIV, fig. 6.)

Introduced from Europe, fairly common in northeastern United States and Nova Scotia; occurring also in Texas, Michigan and Oregon, but rare and perhaps not established in the latter two states.

Representative material. MAINE: Portland, *Fernald* in 1897 (G). NEW HAMPSHIRE: Portsmouth, *Robinson 690* (G, NE). MASSACHUSETTS: Cambridge, *Deane* in 1889 (G), *Fernald* in 1891 (G, NE). RHODE ISLAND: Providence, *Collins* in 1892 (G). NEW YORK: Albany, *Burnham* in 1911 (G). NEW JERSEY: Kaighn's Point, Camden, *Parker* in 1871 (C, G). DELAWARE: Wilmington, *Commons* in 1900 (G). MICHIGAN: near Forest, Lampton County, *Dodge 11* (US). LOUISIANA: Natchitoches, *Palmer 7527* (US). TEXAS: near Long Lake, Anderson County, *Eggert* in 1899 (MBG); Bastrop, *Duval 2* (US); Lyons, *Gresenschlag 7238* (US); Dallas, *Reverchon 2199* (MBG). OREGON: Linnton, near Portland, *Suksdorf 1934* (G, WSC), *Nelson 845* (G).

The fruits of *L. ruderale* are very similar to those of *L. ramosissimum* and it seems that the two species may be related more

closely than has been supposed. *L. ruderale*, however, differs in the following respects. The plant is foetid, it is much less pubescent, the hairs are usually shorter; the sepals are less broad; petals are usually entirely lacking; pedicels are more slender and not flattened; fruits are somewhat broader and more ovate than truly elliptic, and the winged apices are less prominent.

It is with some misgiving that the writer has included here *L. texanum* Buckley. Most workers have considered this species to be more closely related to the *L. virginicum* complex. However, Buckley's type can be fairly well matched by collections of *L. ruderale* from Europe, and careful search has failed to reveal distinguishing characters of specific value.

As mentioned above, there is close relationship between *L. ramosissimum* and *L. ruderale*. *Lepidium texanum* seems to be more or less intermediate between the two, but closer to the latter. Further field study might show that *L. ramosissimum* and *L. texanum* are both varieties of *L. ruderale* proper.

The following collections are representative of the type of plant which Buckley called *L. texanum*. TEXAS: west of Pecos, Tracy & Earle 382 (MBG); near Comanche, Eggert in 1900 (MBG); near Fort Mason, Buckley in 1861 (PA, type, photograph at M).

10. *LEPIDIUM RAMOSISSIMUM* Nelson, Bull. Torr. Bot. Club 26: 124. 1899.

L. ramosissimum var. *robustum* Thell. Monog. Lepid. 236. 1906. Of no taxonomic value; the type, collected in Saskatchewan in 1858, Bourgeau, is too immature for the linear cauline leaves to be evident.

L. divergens Osterhout, Bull. Torr. Bot. Club 30: 237. 1903. Osterhout 2642, the type, collected at Tennessee Pass, Lake County, Colorado, is a low growing, glabrous fruited form that is not branched so much as most material.

L. Fletcheri Rydberg, Bull. Torr. Bot. Club 34: 428. 1907. The type, collected by Fletcher at Winnipeg, is a simple plant with cauline leaves that are more divided than usual. The fruits have a rather open sinus, but are not truly obovate, as described, and are well within the range of variation of *L. ramosissimum*.

Profusely branched (rarely simple) biennial (annual?), densely though finely pubescent to pulverulent, 1.5-5 dm. tall; basal leaves pinnatifid, the lobes often again toothed, upper cauline leaves (second year leaves) entire and linear, lower cauline leaves oblanceolate or oblong and few-toothed; inflorescence of many few-flowered corymb-like racemes in axils of upper leaves, terminated by longer fairly open racemes 2-4 cm. long, whole stem thus densely floriferous and leafy; pedicels about equalling fruits, ascending to spreading, slightly flattened and somewhat

wing-margined; sepals *ca.* 1 mm. long, oblong, nearly half as broad as long, pubescent on back; petals linear, not so long as sepals; stamens 2; fruits 2.5–3.5 mm. long, often ciliate or uniformly pubescent, elliptic or nearly so, shallowly notched and winged at apex, the sinus one-sixth to one-eighth length of fruit, open; style lacking; cotyledons incumbent. (Plate XV, fig. 3.)

In the Rocky Mountains, from Manitoba to New Mexico.

Representative material. Canada: railroad ballast, Matane, Matane County, Quebec, *Fernald & Pease 25103* (G); Schreiber, Thunder Bay District, Ontario, *Pease & Bean 23562* (G); Winnipeg, Manitoba, *Thompson 25* and *54* (MBG), *Fletcher* in 1902, type of *L. Fletcheri* (NY); Lake Winnipeg Valley, *Bourgeau* in 1857 (G); Saskatchewan, *Bourgeau* in 1858, type collection of var. *robustum* (G); Banff, Alberta, *Sanson* in 1902 (F, P). United States: NORTH DAKOTA: Leeds, Benson County, *Lunell* in 1904 (G); Sheyenne, Eddy County, *Lunell* in 1908 (NY). MONTANA: Westby, *Larsen 36* (MBG); St. Mary's Lake, Glacier National Park, *Standley 17322* (US); Anaconda, *Blankinship 766* (F, M, MBG, P, W). WYOMING: near Big Piney, Sublette County, *Payson & Payson 4360* (G, MBG, PA, W, WSC); Centennial, *A. Nelson 7990* (G, I, MBG, NY, P, W); Laramie, *A. Nelson 1424* (MBG, NY, W type). COLORADO: near Grand River, Hot Sulphur Spring, *Nelson 9776* (C, E, MBG, W); Wolcott, *Osterhout 2665* (NY, W); Tennessee Pass, *Osterhout 2642*, type collection of *L. divergens* (NY, P, PA, W); near Trout Lake, San Miguel County, *Payson & Payson 4135* (C, G, MBG, S, W). NEW MEXICO: Rio Fernando de Taos Canyon, *Eggleston 19283* (NY, US); Santa Rosa Area, Guadalupe County, *Nelson 11337* (C, W), racemes less aggregated than usual. WASHINGTON: Long Lake, *Macoun 28* (G). CALIFORNIA: Chollas Valley, San Diego County, *Cleveland* in 1886 (CA). The last two collections are the only ones seen from the respective states and are apparently chance introductions.

11. *LEPIDIUM DENSIFLORUM* Schrad. Ind. Sem. h. Götting. 4. 1832.

Annual, 3–5 dm. tall, diffusely branched, pulverulent or puberulent to pubescent; leaves mostly oblanceolate, basal 4–6 (10) cm. long, 1.5–2 cm. broad, coarsely toothed to pinnatifid, the divisions also toothed, cauline reduced, entire or at most toothed; racemes numerous, 6–15 cm. long, many-flowered, the pedicels more or less flattened, especially on the under side, usually somewhat appressed or but moderately spreading, scarcely equaling fruits; sepals *ca.* 1 mm. long, usually somewhat pilose on back; petals usually lacking, or but rudiments (seldom equaling sepals); stamens 2 (4 rarely); fruits from obovate to oblong-obovate, 2–3.5 mm. long, with rather conspicuous narrow notch in the winged apex, very obscurely reticulate, glabrous to finely and densely pubescent; style obsolete, the stigma sessile or practically so; cotyledons incumbent (rarely somewhat oblique). (Plate XIV, fig. 2.)

The name *L. densiflorum* is used arbitrarily for this species since the writer has had no opportunity to study the various European types involved. This species differs from *L. virginicum* in that the fruit is decidedly obovate or oblong-obovate rather than rotund or elliptic-rotund, also the upper half of the fruit averages greater in width than the lower half. The usually in-

cumbent position of the cotyledons of *L. densiflorum* is also of help in separating the two species. From *L. ruderale* it differs chiefly in the obovate to oblong-obovate fruits. They are certainly neither elliptic nor ovate-elliptic. From *L. lasiocarpum* it differs as pointed out in the discussion under *L. densiflorum* var. *ramosum*.

KEY TO VARIETIES OF *L. DENSIFLORUM*

- Fruits averaging about 2.5 mm. long, more elliptic-ovate or obovate-rotund than oblong-obovate; pedicels but slightly flattened 11a. *L. densiflorum* var. *typicum* ✓
- Fruits averaging 3 mm. long or slightly more, more oblong-obovate than obovate-rotund; pedicels rather conspicuously flattened.
Pedicels flattened on both upper and lower sides, about twice as broad as thick 11e. *L. densiflorum* var. *ramosum* ✓
- Pedicels flattened chiefly on lower side, not twice so broad as thick.
Silicles glabrous 11b. *L. densiflorum* var. *Bourgeauanum* ✓
- Silicles pubescent.
Pubescence confined to margins only 11c. *L. densiflorum* var. *elongatum*
- Silicles uniformly pubescent 11d. *L. densiflorum* var. *pubicarpum*

11a. *LEPIDIUM DENSIFLORUM* var. *TYPICUM* Thell. Bull. Herb. Boiss. ser. 2, 4: 706. 1904.

L. densiflorum Schrad. Ind. Sem. h. Götting. 4. 1832.

L. densiflorum var. *typicum* Thell. Monog. Lepid. 234. 1906, as regards plants of Europe and eastern United States.

L. ruderale and *L. apetalum* in whole or in large part as considered by most early American authors.

L. neglectum Thell. Bull. Herb. Boiss. ser. 2, 4: 708. 1904; Monog. Lepid. 237. 1906. (See discussion below.)

Fruits smaller (ca. 2.5 mm. long) than in western varieties, somewhat obovate-rotund or obovate-rotund; pedicels but slightly flattened; racemes usually quite elongate; cauline leaves mostly toothed.

Common weed in Canada and in most states east of the Rocky Mountain area, rare in the Rocky Mountain and Pacific states.

Representative material. KANSAS: Riley County, *Norton 25* (F, NY, W), cited by Thellung as *L. neglectum*; Cherokee County, *Hitchcock 25a* (G, MBG, NY, US, W), also cited by Thellung as *L. neglectum*. IOWA: Ames, *Pammell 45* (MBG, NY). MISSOURI: Courtney, *Bush 781, 8898, 9758, 9756* (MBG and various other herbaria). OKLAHOMA: Waynoka, Woods County, *Stevens 605½* (G). TEXAS: north of Valley Springs, Llano County, *Cory 6225* (G). MONTANA: Bozeman, *Blankinship 57* (F, M, MBG, PA, W); Fort Missoula, *Jones* in 1909 (P). COLORADO: Grand Junction, Mesa County, *Eastwood 5159* (CA). UTAH: Marysvale, Piute County, *Jones 5338f* (P). ARIZONA: Flagstaff,

Coconino County, *Hanson & Hanson 4708* (MBG). OREGON: Portland, *Nelson 2895* (G). CALIFORNIA: Yosemite Valley, *Abrams 4382* (C, G, P, S).

Lepidium neglectum Thell. is not maintainable as a species in the writer's opinion. The material which Thellung cited is mostly fairly representative of *L. densiflorum* var. *typicum*. However, considering how extremely common *L. virginicum* and *L. densiflorum* are in the eastern and central states, it would not be surprising to find evidence of hybridization between the two. Several collections have been studied which are intermediate in character between these two species and which are suspected of being hybrid in origin. Plants of such a nature are: MISSOURI: East St. Louis, *Eggert* in 1886 (CA, US); Courtney, *Bush 781* (MBG, US); ILLINOIS: Salem, *Bebb* in 1862 (US); NEW JERSEY: Swedesboro, *Lippincott* in 1897 (PA); eastern PENNSYLVANIA: *Porter* in 1898 (PA). All these collections are apetalous or nearly so and the fruits are about as large as those of *L. virginicum* but are shaped more like those of *L. densiflorum*. On the whole, since the cotyledons are incumbent, they are more similar to the latter species, and are therefore cited here.

11b. LEPIDIUM DENSIFLORUM var. *Bourgeauanum* (Thell.) comb nov.

L. Bourgeauanum Thell. Monog. Lepid. 237. 1906. The type, collected by Bourgeau in Saskatchewan in 1857-58, has not been seen, but description leaves little doubt of the identity.

Silicles somewhat oblong, glabrous, averaging 3 mm. long; pedicels flattened somewhat on both surfaces, but not twice so broad as thick.

Fairly common in western Montana, Wyoming, Colorado, Nevada, Idaho, eastern Washington and Oregon, northern California, and Arizona; western Canada to Alaska.

Representative material. MONTANA: Spanish Basin, Gallatin County, *Rydberg & Bessey 4140* (M); Missoula, *Hitchcock 2311* (M). WYOMING: Yellowstone River, *Nelson & Nelson 5745* (G, MBG, P, W, but not NY); Powder River, *Nelson 9369* (G, MBG, NY, P, S, W); Laramie, *Nelson 8233* (C, F, P, S, W). COLORADO: Paradox, Montrose County, *Walker 97* (G, MBG, P, S, W), approaching var. *typicum*. UTAH: Modena, Iron County, *Goodding 1012* (C, F, G, MBG, P, W). ARIZONA: Alpine, Apache County, *Goodding 1257* (NY). NEVADA: Calientes, Lincoln County, *Tidestrom 9511* (US); Reno, *Jones* in 1897 (MBG, P). IDAHO: Boise, *Clark 133* (C, F, MBG, P, S, W), approaching var. *typicum*; Plymouth, Canyon County, *Macbride 179* (C, F, G, MBG, W, WSC). WASHINGTON: near Bingen, *Suksdorf 11862* (C, CA, I, MBG, S, WSC); east of Spokane, *Suksdorf 8850* (WSC). CALIFORNIA: near Mokelumne River, Colusa County, *Rattan* in 1880 (S). A collection made near Pony, Madison County, Montana, *Rydberg & Bessey 4141* (M), approaches var. *elongatum*. Two collections from Siskiyou County, California, are intermediate between this variety and var. *ramosum*: Yreka, *Butler 1612* (C, CA, MBG, P, S, W); near Sisson, *Heller 12561* (CA, F, G, I, MBG, S).

These plants have not been recognized as distinct from the eastern variety by other workers, but the differences in size and

shape of the fruit (as indicated in the key) are quite constant. The varietal name *Bourgeauanum* is adopted because it seems quite certain that Thellung's species cannot be maintained and, judging from the description, leaves, flowers, and fruits all come within the range of variation of the western variety of *L. densiflorum*.

11c. *LEPIDIUM DENSIFLORUM* var. *ELONGATUM* (Rydberg) Thell. Bull. Herb. Boiss. ser. 2, 4: 706. 1904; Monog. Lepid. 235. 1906.

L. elongatum Rydberg, Bull. Torr. Bot. Club 29: 234. 1902.

L. simile Heller, Bull. Torr. Bot. Club 26: 312. 1899. The type, *Heller & Heller 3044a*, is practically identical with *Heller 21*, the type of *L. elongatum*.

Silicles oblong, ca. 3.5 mm. long, pubescent on margins only; pedicels somewhat flattened; cotyledons sometimes somewhat oblique.

Western Idaho, eastern Washington, and northern Oregon; north to British Columbia.

Representative material. IDAHO: McCammon, Bannock County, *Nelson & Nelson 5404* (S, W, WSC); near Lewiston, *Hitchcock, Samuel, & Crisafulli 2509* (CA, M, P, S, W, WSC), *Heller & Heller 3044a*, type collection of *L. simile* (MBG, NY), *Heller & Heller 3008* (C, MBG, NY, PA, S, WSC). WASHINGTON: Almata, Whitman County, *Elmer 21* (C, MBG, NY type, W); near Asotin, *Hitchcock, Samuel, & Crisafulli 2555* (CA, M, P, S, W, WSC); Ellensburg, *Thompson 8328* (E, NY, PA); Columbia River, Klickitat County, *Suksdorf 1942* (C, F, G, MBG, WSC). OREGON: Pendleton, *Jones* in 1905 (P, S); east of Stein's Mountains, Harney County, *Henderson 8424* (CA); John Day Valley, Gilliam County, *Henderson 5050* (CA, G, MBG, S); near Portland, *Suksdorf 3232* (WSC), *Nelson 3071* (G).

11d. *LEPIDIUM DENSIFLORUM* var. *PUBICARPUM* (Nelson) Thell. Bull. Herb. Boiss. ser. 2, 4: 705. 1904; Monog. Lepid. 235. 1906.

L. pubicarpum Nelson, Bot. Gaz. 30: 189. 1900. *Nelson & Nelson 6793*, although second number cited by Nelson, was designated the type collection by Thellung and seems most representative of the two collections which Nelson mentioned.

Whole silicle pubescent, averaging 3–3.5 mm. long; pubescence soft, not stiff as in *L. lasiocarpum*; pedicels not greatly flattened.

From central Montana to Utah, west to extreme northwestern California, and occasionally in Oregon and Washington. Apparently most common in Utah.

Representative material. MONTANA: 12 miles southeast of Harlowton, *Hitchcock 2405* (M); Dwelle's, Gallatin County, *Nelson & Nelson 6793* (G, MBG, NY, W type). WYOMING: Nez Perces Creek, Yellowstone National Park, *Nelson & Nelson 6235*, first number cited by Nelson (W); Snake River, Teton County, *Williams 774* (CA, MBG, NY). UTAH: Red Rock Canyon, near Salt Lake City, *Rydberg 6085* (NY, W). NEVADA: Humboldt Mts., *Torrey 19* (G, NY); Palisade, Eureka County, *Jones 3785* (CA, MBG, NY, P, S). IDAHO: Silver City, *Macbride 390* (C, F, G, MBG, NY, W, WSC); Devil Creek, Owyhee County, *Nelson & Macbride 1737* (MBG, NY, W). WASHINGTON: Waitsburg,

Walla Walla County, *Horner R4B74* (G). OREGON: near Cascades, Hood County, *Henderson 78* (G). CALIFORNIA: Big Valley, Lassen County, *Baker & Nutting* in 1894 (C); Goose Valley, Shasta County, *Eastwood 743* (CA, G, PA).

11e. *LEPIDIUM DENSIFLORUM* var. *RAMOSUM* (Nelson) Thell. Bull. Herb. Boiss. ser. 2, 4: 706. 1904.

L. ramosum Nelson, Bull. Torr. Bot. Club 26: 125. 1899. Type, *Nelson 4682*, from Granger, Wyoming.

L. densiflorum var. *pubescaule* Thell. Bull. Herb. Boiss. ser. 2, 4: 706. 1904. The type collection, *Fendler* in 1845, without locality, has not been seen by the writer, but the second collection cited, *Heller & Heller 3673*, is undoubtedly var. *ramosum* (G, MBG, P, S). *Heller & Heller 3673* at Washington State College, however, is *L. virginicum*.

Fruits ca. 3.5 mm. long, glabrous; pedicels conspicuously flattened on both surfaces, nearly twice as broad as thick.

Southwestern Wyoming to northwestern New Mexico, west to Nevada, sporadically in Arizona and eastern California.

Representative material. WYOMING: Granger, *Nelson 4682* (NY, W type); Point of Rocks, *Nelson 3092* (MBG, W). COLORADO: without locality, *Brandege 1242* (G, MBG); Grand Junction, Mesa County, *Jones* in 1883 (P). NEW MEXICO: without locality, *Baker 355* (MBG, NY, P); near Santa Fe, *Heller & Heller 3673*, cotype collection of var. *pubescaule* (G, MBG, P, S, but not WSC). UTAH: Chepeta Well, *Jones* in 1908 (P); Thompson's Springs, *Rydberg & Garrett 8330* (W); Salt Lake City, *Jones 1430* (F, P, WSC); Green River near Flaming Gorge, *Williams 450* (CA, MBG, W). NEVADA: near Ely, *Keck 617* (P); Truckee Pass, *Kennedy 1596* (CA); Gardnerville, *Baker 1086* (C, CA, G, MBG, P, W). CALIFORNIA: Barstow, *Parish 9666* (S).

Although *Lepidium densiflorum* var. *typicum* is so different from all forms of *L. lasiocarpum* that there seems to be scarcely any relationship between them, var. *ramosum* so closely approaches in character some specimens of *L. lasiocarpum* var. *georginum* that one can scarcely distinguish them. This intergradation is so gradual and complete that the question is raised as to whether it would not be more correct to consider *L. ramosum* a variety of *L. lasiocarpum*. However, when the varieties *pubicarpum*, *elongatum*, and *Bourgeauanum* are studied, it can be seen that var. *ramosum* grades into each of these varieties, and that the relationship is really much closer to *L. densiflorum* than to *L. lasiocarpum*.

12. *LEPIDIUM VIRGINICUM* L. Sp. Pl. 645. 1753.

Annual, freely branched, 1.5-6 dm. tall, sparingly pubescent to rather densely hirsute; leaves irregularly toothed or incised to pinnatifid, the divisions often again dissected, basal sometimes as much as 15 cm. long and 5 cm. broad, upper cauline much reduced and usually entire or but remotely toothed; racemes numerous, many-flowered; pedicels slender, terete or

nearly so, erect or spreading, usually somewhat longer than fruits; sepals glabrous or slightly pilose on back, *ca.* 1 mm. long; petals from about equal to sepals to 2 or 3 times as long, rarely minute; stamens 2, sometimes 4, rarely 6; fruit glabrous, from elliptic-rotund to nearly orbicular, 2.5–4 mm. long, scarcely margined, shallowly notched at apex, the style practically lacking, the stigma usually well included in the shallow notch, upper surface flat or slightly concave, very obscurely reticulate; cotyledons accumbent to oblique or practically incumbent. (Plate XV, fig. 1.)

KEY TO VARIETIES OF *L. VIRGINICUM*

- Cotyledons accumbent 12a. *L. virginicum*
var. *typicum*
- Cotyledons oblique to incumbent.
Upper portion of stem and pedicels glabrous.
Cotyledons incumbent; fruits 2.25 mm. long or less 12e. *L. virginicum*
var. *medium*
f. *pusillum*
- Cotyledons oblique; fruits mostly over 2.25 mm. long 12d. *L. virginicum* ✓
var. *medium*
- Entire stem, as well as pedicels, puberulent to cinereous-hirsute.
Cauline leaves mostly simple, or at most but incised; cotyledons usually oblique; plants usually 3–6 dm. tall 12b. *L. virginicum*
var. *pubescens* ✓
- Cauline leaves with narrow lobes, or parted; cotyledons practically incumbent; plants 1–2 dm. tall 12c. *L. virginicum*
var. *Robinsonii*

12a. *LEPIDIUM VIRGINICUM* var. *typicum* nom. nov.

L. virginicum L. Sp. Pl. 645. 1753.

L. virginicum subsp. *eu-virginicum* Thell. Monog. Lepid. 225. 1906, in large part.

L. virginicum subsp. *eu-virginicum* var. *pinnatisectum* O. E. Schultz, in Urban Symb. Antill. III, 3: 495. 1903, as treated by Thellung (Monog. Lepid. 229. 1906), as to specimen cited from New York.

L. virginicum subsp. *texanum* Thell. Monog. Lepid. 224, 229. 1906, in part.

L. virginicum var. *linearifolium* Farwell, Am. Midland Nat. 12: 121. 1930. Plant with reduced, narrow upper leaves; not unusual.

Fruits usually somewhat longer than broad; cotyledons accumbent; otherwise much as in the pubescent-stemmed western varieties.

Eastern and central United States and Canada to Texas, Oklahoma, Iowa, and the Dakotas; sometimes introduced farther west.

Representative material. MASSACHUSETTS: Monson, Hampden County, *Seymour* 675 (G, MBG). NEW JERSEY: Atlantic City, *Redfield* 478 (MBG). PENNSYLVANIA: Long Pond, Luzerne County, *Heller & Halbach* 500 (G). VIRGINIA: Portsmouth, Norfolk County, *Rugel* in 1840 (MBG). SOUTH CAROLINA: Manning, Clarendon County, *Stone* 451, & 549 (PA). FLORIDA: Myers, Lee County, *Hitchcock* 2 (G, MBG). MISSISSIPPI: Chandeleur Island, *Tracy* 5046 (MBG). LOUISIANA: Natchitoches, *Palmer* 7527 (CA, MBG, US). TEXAS: Galveston, *Tracy* 9195 (F, G, MBG). MICHIGAN: Lake Linden, *Farwell* 10536, var. *linearifolium* of Farwell (M), *Farwell* 11135 (M); Mo. Bot. Gard., St. Louis, *Hitchcock* 2652 (M). NEBRASKA: *Goodding* 2219 (MBG). CALIFORNIA: St. Helena, Napa County, *Jepson* in 1894 (G).

12b. *LEPIDIUM VIRGINICUM* var. *PUBESCENS* (Greene) comb. nov.
L. intermedium var. *pubescens* Greene, Bot. Gaz. 5: 157. 1881.
L. medium var. *pubescens* (Greene) Robinson, Gray, Syn. Fl. N. Amer. 1¹: 127. 1895.

L. virginicum subsp. *texanum* (Buckl.) Thell. Monog. Lepid. 224, 229. 1906, in part (not *L. texanum* Buckley).

L. virginicum subsp. *texanum* var. *pubescens* (Greene) Thell. Monog. Lepid. 224, 230. 1906.

L. Menziesii DC. Syst. 2: 539. 1821. (See discussion below.)

L. virginicum subsp. *Menziesii* (DC.) Thell. Monog. Lepid. 225, 230. 1906, in large part.

L. occidentale Howell, Erythea 3: 32. 1895, based on a collection which has flowers with four stamens, a condition which is not particularly unusual: Umpqua Valley, Oregon, May 2, 1887, *Howell*.

L. bernardinum Abrams, Bull. Torr. Bot. Club 37: 149. 1910. Type, *Abrams* 2826, from Bear Valley, a representative plant for the variety as it occurs in southern California.

L. hirsutum Rydberg, Bull. Torr. Bot. Club 39: 322. 1912. A name substituted for *L. medium* var. *pubescens* Greene, as a species.

L. virginicum subsp. *centrali-americanum* var. *canescens* Thell. Monog. Lepid. 231. 1906. The type (Bear Mountains, Grant County, New Mexico, *Metcalf* 168) is good average material of this variety and cannot be given recognition.

L. virginicum subsp. *eu-virginicum* var. *pubescens* Schmitz, Thell. Monog. Lepid. 229. 1906. ex. char. The type, *Heller* 1495, collected in southern Texas in 1894, has not been seen. cc *

Plants usually tall and sturdy, the cauline leaves toothed to entire, often almost hispid; cotyledons oblique.

Western Colorado, New Mexico, Utah, Arizona, southern Nevada and throughout California; much less common in western Wyoming, southern Montana, Idaho, and coastal Oregon and Washington.

Representative material. NEW MEXICO: Winsor's Ranch, San Miguel County, *Standley* 4534 (CA, G, MBG); Mangas Springs, Grant County, *Greene* 102, type collection (G); Bear Mountains, Grant County, *Metcalf* 168, type collection *L. virginicum* subsp. *centrali-americanum* var. *canescens* Thell. (MBG, W). ARIZONA: vicinity of Prescott, *Wolf* 2324 (CA, S), plants with

pubescent fruits; Flagstaff, *Hanson A100* (MBG, NY, W). NEVADA: Charleston Mountains, *Hitchcock* in 1927 (P), *Jaeger* in 1926, with pubescent fruits (P). UTAH: Hidden Lake, near Glendale, Kane County, *Jones 25334* (CA, MBG, P); Uintah Mountains, Summit County, *Payson & Payson 4858* (MBG, W). COLORADO: Ridgway, Ouray County, *Payson & Payson 3337* (G, W). WYOMING: east of Afton, Lincoln County, *Payson & Armstrong 3320* (G, I, MBG, P, PA, W); Alpine, *Payson & Armstrong 3392* (G, I, MBG, P, PA, W). MONTANA: west Yellowstone, Gallatin County, *Payson & Payson 1922* (CA, G, MBG, NY, W). IDAHO: Bear Creek, below Parker Mountain, Custer County, *Macbride & Payson 3308* (C, G, MBG, S, W, but not CA nor P). WASHINGTON: California, "A.M.", probably from vicinity of Seattle or Victoria, photograph of the type of *L. Menziesii* (US). OREGON: Portland, *Sheldon S10547* (G, MBG, NY, P, WSC). CALIFORNIA: Truckee, *Heller 7090* (C, CA, F, G, MBG, S, W); White Mountains, Inyo County, *Duran 537* (C, CA, F, MBG, P, S, W); Bear Valley, San Bernardino County, *Abrams 2326*, type collection of *L. bernardinum* (C, F, G, MBG, NY, P, PA, US), *Hitchcock 2812* (M); Fallbrook, San Diego County, *Jones 2639* (CA, MBG, P). BRITISH COLUMBIA: Campbell River, Vancouver Island, *Howell 7595* (CA); Nanaimo, *Eastwood 9767* (CA).

On the north Pacific Coast var. *pubescens* appears to intergrade with var. *medium*, since plants from that region vary greatly in the amount of pubescence present. As examples of such plants, may be cited: BRITISH COLUMBIA: vicinity of Victoria, *Macoun 78237* & *78238* (F, NY), Sidney, *Macoun 91908* (NY). WASHINGTON: Olympic Mountains, *Elmer 2697* (MBG, NY, S, WSC); San Juan Island, *Zeller & Zeller 938* (G, MBG, NY), *Peck 13142* (MBG, WSC).

It must be admitted that the disposition of the western varieties of *L. virginicum* may be open to criticism. However, it is through var. *pubescens* that the close relationship of these western plants to the eastern ones is made evident, the only constant difference being that of the cotyledons.

Through the careful work of J. T. Howell, who examined the Menzies type at the British Museum, the identity of *L. Menziesii* is fairly definitely ascertained. It is certain that it belongs to the *L. virginicum* group, as the fruits match material of that species, *Eastwood 9767*, quite closely; the fact that the stem and inflorescence are "finely cinereous-puberulent" makes it fairly certain that it belongs to this pubescent variety, although Mr. Howell considers the pubescence a little more dense on the Menzies plant than on the Eastwood collection. However, the former plant has pubescent silicles, a condition seen in only two collections of *L. virginicum*, neither of which came from the northwest. Because of this fact, the possibility that *L. Menziesii* might be the same as some of the pubescent-fruited plants of *L. densiflorum* suggested itself, but several collections of such material were sent to Mr. Howell, who ventured the opinion that such could not be the case, as the fruits were entirely different in shape, the plants had a different aspect, and, of course, lacked the conspicuous petals of the type.

Although var. *pubescens* shows considerable variation in pubescence and in the amount of division of the leaves, one can find plants from southern California with the basal leaves as much dissected as are those of plants from Oregon, Washington, or New Mexico.

12c. *LEPIDIUM VIRGINICUM* var. *Robinsonii* (Thell.) comb. nov.

L. Robinsonii Thell. Monog. Lepid. 255. 1906, based apparently upon *Jones 3050*, from San Diego, but all three collections cited agree quite closely.

L. californicum Nutt.; Torr. and Gray, Fl. N. Am. 1: 115. 1838, not *L. virginicum* var. *californicum* Jepson, Man. Fl. Pl. Calif. 439. 1925, based upon *Jepson 6623*, from Barstow, California, which is apparently either *L. virginicum* var. *medium* or *L. lasiocarpum* var. *georginum*. I have been unable as yet to see this type.

A rather small form, usually less than 2 dm. tall, densely hirtellous; cauline leaves often deeply lobed into narrow segments; cotyledons from slightly oblique to incumbent.

On the mainland and islands of coastal southern California; south into Lower California.

Representative material. CALIFORNIA: Santa Barbara, *Nuttall*, type collection *L. californicum* (NY); Santa Cruz Island, *Hoffmann 654* (P), *Howell 6296* (CA); Los Angeles, *Grant 3469* (NY); San Gabriel Mountains, *Howell 3337* (CA); near Riverside, *Hall 3795* (W); near Corona, *Munz & Harwood 3399* (C, P, S, W); Santa Ana Canyon, *Howell 2559* (CA); San Diego County, near Bernardo, *Abrams 3365* (F, MBG, NY, P, S), Campo, *Eastwood 9452* (CA), Potrero Grade, *Munz 9494* (P), Point Loma, *Orcutt 1039* (MBG), San Diego, *Jones 3050*, type collection of *L. Robinsonii* (CA, MBG, I, NY, US, WSC, but not one sheet at CA, and sheet at P).

The relationship of these plants is plainly close to var. *pubescens*, although the cotyledons are less oblique than in that variety. It should be noted that although Thellung cited *Jones 3050* first in describing *L. Robinsonii*, that collection consists of two distinct species, and it is only by checking with the description and with the other two collections cited, namely, *Orcutt 1039* and *Hall 3795*, that it can be seen that he was concerned with plants of the *L. virginicum* group.

12d. *LEPIDIUM VIRGINICUM* var. *medium* (Greene) comb. nov.

L. medium Greene, Erythea 3: 36. 1895.

L. intermedium Gray, Pl. Wright. 2: 15. 1853, not *L. intermedium* Richard, Fl. Abyssin. 1: 21. 1847.

L. idahoense Heller, Bull. Torr. Bot. Club 26: 312. 1899. *Heller & Heller 3044*, the type collection, is good representative material of the variety as here considered.

L. glaucum Greene, Pittonia 4: 312. 1901, based upon Cockrell's collection from Mesilla Park, New Mexico, in 1900. The type is merely a depauperate specimen of this glabrous variety.

Stems and pedicels glabrous or essentially so; cotyledons oblique to nearly incumbent; fruits mostly 2.5 mm. long or more.

Western Oklahoma, Rocky Mountains from southwestern Texas to Arizona, Colorado, and southern Wyoming; western Idaho, Washington, Oregon, south into northern California.

Representative material. OKLAHOMA: Fort Sill, Comanche County, *Clemens 11590* (CA, MBG, W). TEXAS: Alpine, *Jones 25836* (CA, MBG, P). NEW MEXICO: Mesilla Park, *Cockerell* in 1900, type collection *L. glaucum* (NY); Organ Mountains, *Wright 1320*, (G type), *Wooton* in 1899 (P, W); Mangas Springs, *Metcalf 21* (C, G, MBG, P, S, W). ARIZONA: Tucson and vicinity, *Pringle* in 1884 (CA), *Eastwood 3158* (CA). COLORADO: Durango, *Eastwood 5342* (CA); Livermore, *Payson & Payson 4244* (MBG, W). WYOMING: Fish Creek, Albany County, *Payson & Payson 2509* (F, G, MBG, P, PA, W). IDAHO: near Lewiston, *Heller & Heller 3044*, type collection *L. idahoense* (C, MBG, NY, PA, S, US), *Sandberg, MacDougal & Heller 145* (CA, F, G, MBG, NY, P, S). WASHINGTON: near Asotin, *Hitchcock, Samuel & Crisafulli 2540* (CA, M, P, S, W, WSC); Klickitat County, *Suksdorf 2362* (F, G, MBG, S, WSC), *7833* (WSC); Wawawai, *Piper 3811* (G). OREGON: Portland, *Sheldon S10632* (G, MBG, P, WSC); near Roseburg, *Howell 1486* (C, MBG, WSC). CALIFORNIA: Hoopa Valley, Humboldt County, *Rattan* in 1878 (G).

In general aspect, material from Idaho and Washington seems to differ from plants of New Mexico, due chiefly to the more branching habit of the latter. However, this is not a constant difference, and indeed, there do not appear to be any good diagnostic characters by which they can be separated. As evidence of the great similarity of plants from the two areas it should be noted that *Suksdorf 7833* is as near a perfect match for *Wooton's* collection of 1899 from the Organ Mountains, New Mexico, as may reasonably be expected to exist.

12e. *LEPIDIUM VIRGINICUM* var. *MEDIUM* f. *pusillum* f. nov.

Upper portion of stems glabrous; cotyledons practically incumbent; fruits 2.25 mm. long or less. (Caulis glaber; embryo fere notorrhizus; silicula 2–2.25 mm. longa).

Type: New Braunfels, Comal County, Texas, May, 1850, *Lindheimer 462* (MBG). Collection also at Gray Herbarium.

Extreme southwestern Texas and New Mexico.

Representative material. TEXAS: without locality, *Lindheimer 671* (C, F, G, MBG); Keechi, Leon County, *Palmer 13421* (US); Austin, *Wright* in 1848 (G); near Holland, Bell County, *Wolff 791a* (US); Granbury, Hood County, *Eggert* (MBG); Mission, *Hanson 325* (MBG); Laredo, *Reverchon 3722, 3721* (MBG); Uvalde, *Palmer 11340* (MBG). NEW MEXICO: Organ Mountains, *Wright 1326* (MBG, PA), approaching var. *medium*.

13. *LEPIDIUM SORDIDUM* Gray, Pl. Wright. 1: 10. 1852.

L. granulare Rose, Contrib. U. S. Nat. Herb. 8⁴: 294. 1905. The type, from Mexico City, *Pringle 8488*, is but a form with fruits slightly larger than usual.

L. ruderalis var. *lasiocarpum* Engelm.; Gray, Pl. Wright. 1: 15. 1852, based on *Lindheimer 459* and *460*.

Annual or biennial, 1–3.5 dm. tall, spreading to erect, granular-puberulent with clavate or flattened hairs; basal leaves spatulate-oblongate, 5–7 cm. long, ca. 2 cm. broad, pinnate-pinnatifid and lobed, the ultimate divisions linear, cauline leaves smaller, but pinnate-pinnatifid to pinnatifid with linear-lobed divisions; racemes numerous, crowded, 2–3 cm. long; pedicels about equal

to, or more commonly, slightly longer than fruit, erect or spreading, slender; sepals 0.5–0.8 mm. long, pilose; petals wanting or linear and minute; stamens 2 (4); silicles ovate to ovate-elliptic, 1.5–2.2 mm. long, glabrous, slightly winged at apex, sinus *ca.* one-tenth the length of fruit; style nearly equal to sinus, stigma about equalling apices of fruit; cotyledons incumbent. (Plate XIV, fig. 5.)

Extreme southwestern Texas; extending into Chihuahua and Federal District, Mexico.

Material seen. TEXAS: without locality, *Buckley* in 1882 (NY); expedition from western Texas to El Paso, May–Oct. 1849, *Wright 18*, type collection (G type, US); Rio Grande, *Havard 217* (G); Musquez Canyon, *Havard* in 1883 (US); Alpine Creek, Brewster County, *Cory 1606* (G); Alpine, *Palmer 30575* (MBG, NY, PA); Davis Mountains, *Young* in 1914 (G, MBG); 15 mi. north of Fort Davis, *Palmer 31017* (MBG); Fort Davis, *Eggleston 17403* (NY), *Ferris & Duncan 2710* (CA, NY, MBG, S).

14. *LEPIDIUM AUSTRINUM* Small, Fl. Southeastern U. S. 468, 1331. 1903.

L. lasiocarpum var. *tenuipes* Wats. Proc. Am. Acad. 17: 322. 1882, in small part (includes *Berlandier 2488*) *Matamoros*.

An erect, somewhat strict annual (biennial?) 1–5 dm. tall, densely hirsute throughout, usually simple below; basal leaves spatulate-oblongate, 5–9 cm. long, 1–2 cm. broad, divided to pinnate, the divisions oval to obovate, serrate-dentate, or lobed, cauline leaves smaller, averaging 0.7–1 cm. broad below branches, serrate-dentate, those of inflorescence narrowly oblongate, less than 0.5 cm. broad, serrate or entire; racemes 5–20 cm. long in fruit; pedicels 2.5–5 mm. long in fruit, spreading to slightly recurved, slender, somewhat flattened, usually glabrous on lower side and short-hirsute above; sepals slightly less than 1 mm. long, pilose-hirsute on back; petals sometimes lacking, but usually present, minute to slightly longer than sepals; stamens 2; silicles ovate to elliptic-obovate, 2.25–3 mm. long, slightly less in width, with narrow winged apex, the sinus shallow (*ca.* one-eighth length of fruit), both surfaces usually conspicuously hirsute with slightly appressed hairs, in some cases margin only pubescent; cotyledons incumbent. (Plate XV, fig. 4.)

Central and southwestern Texas, Mexico.

Representative material. Without definite locality, *Berlandier 2488* (NY, PA). TEXAS: Peña Colorado, *Havard 74* (G, US) with some doubt; Dallas, *Reverchon 2726* (G, MBG), *Reverchon 2198, 2199, and 2200* (MBG), *Bush 583 and 633* (NY); Roosevelt, *Jones 28081* (C, MBG, P); San Marcos, *Palmer 12113* (C, MBG, W); New Braunfels, *Lindheimer 459* (MBG), *460* (MBG, PA), *672* (C, F, G, MBG, NY, PA), *673* (F, G, NY); Wharton, *Palmer 4972* (F, MBG, US); Experiment Station, Sonora, *Jones 28083* (C, CA, MBG, P); Kerrville, *Heller 1651*, type collection (C, F, G, MBG, NY type, US, W, WSC).

Very similar, in some respects, to *L. lasiocarpum* (especially var. *tenuipes* from Mexico) but differing in the following char-

L. lasiocarpum
var. *orbiculate*
(Hitchcock)
1945

Matamoros
7/2/1914

acters:— leaves, especially the cauline, usually wider and more entire; plants more erect and strict; pubescence more hirsute than hispid; pedicels longer and more slender; fruits smaller, in shape resembling those of *L. virginicum* more than those of *L. lasiocarpum*; hairs on the fruits somewhat appressed, especially at the apex, whereas they are more spreading in *L. lasiocarpum*.

15. *LEPIDIUM LASIOCARPUM* Nutt.; Torr. and Gray, Fl. N. Am. 1: 115. 1838.

Annual, 0.5–3 dm. tall, prostrate to erect, moderately pubescent to densely hirsute, hispid, or hirsute-hispid; leaves linear to oblanceolate, varying greatly in size, 1–6 cm. long, 0.2–1.5 cm. broad, basal lobed to pinnate-pinnatifid, cauline entire to pinnatifid; racemes 3–8 cm. long; pedicels distinctly flattened on upper and lower sides, two to several times as broad as thick, 1.5–4 (5) mm. long, ascending to spreading; sepals *ca.* 1 mm. long; petals spatulate to linear (lacking), usually no longer than sepals; stamens 2 (4); silicles from oval to elliptic, rotund, or oblong-obovate, 3–4.5 mm. long, 2.25–4 mm. broad, hirsute-hispid on both surfaces to short hispid on margins only, or even glabrous, finely reticulate, apex winged, the sinus one-tenth to one-fifth the length of the fruit, narrow to fairly open; style lacking or essentially so; cotyledons incumbent. (Plate XVII, fig. 2.)

Besides the following varieties which have been recognized, note should be made of two tendencies within the group which are of interest. Plants from Palm Springs and the upper Coachella Valley, California, often have fruits very much like those of *L. dictyotum*. These plants which are usually small with narrow leaves have been reported by some collectors as *L. dictyotum*. Some of the collections from the islands off the coast of Southern California, and from the vicinity of La Jolla, California, consist of plants with larger fruits and larger, more divided leaves than those of any form except var. *Wrightii*.

KEY TO VARIETIES OF *L. LASIOCARPUM*

- | | |
|---|---|
| Plant densely hispid; cauline leaves lobed to pinnatifid; hairs on fruits with pustular bases | 15a. <i>L. lasiocarpum</i> ✓
var. <i>Wrightii</i> |
| Plant hirsute or hirtellous-hispid; cauline leaves more nearly entire, but if lobed or divided, the fruits not pustular-hispid. | |
| Fruits nearly rotund or even rotund-obovate, 4 mm. long and fully as broad. | 15b. <i>L. lasiocarpum</i>
var. <i>rotundum</i> |
| Fruits usually longer than broad, but if rotund, less than 4 mm. broad. | |
| Stems glabrous to pubescent, not hirsute-hispid; pedicels usually glabrous on lower side; plants usually simple or with but 2 or 3 branches from base | 15d. <i>L. lasiocarpum</i> ✓
var. <i>georginum</i> |

Stems hirsute-hispid; pedicels usually pubescent on lower side; plants mostly several-branched from base

15c. *L. lasiocarpum* var. *typicum*

15a. *LEPIDIUM LASIOCARPUM* var. *Wrightii* (Gray) comb. nov.
L. Wrightii Gray, Pl. Wright. 2: 15. 1853.

L. lasiocarpum subsp. *Wrightii* Thell. Monog. Lepid. 266. 1906, in large part.

L. Nelsonii Williams, Bull. Torr. Bot. Club 61: 259. 1934, based on *Nelson 11417*, from Frijoles, New Mexico, which is a slightly more ascending plant than usual, but otherwise typical var. *Wrightii*.

Whole plant hispid, the hairs usually with pustular bases; pedicels much broadened; leaves all lobed to pinnate.

Extreme southwestern Texas, southern and central New Mexico, southeastern Arizona, and adjacent Mexico.

Representative material. TEXAS: near Kent, *Earle & Tracy 391* (NY); Laredo, *Reverchon 3723* (G, MBG, US); Carrizo Springs, Dimmit County, *Palmer 33752* (MBG, NY); El Paso, *Thurber 152* (G, NY), *Jones 3781* (F, NY, P). NEW MEXICO: without locality, *Palmer 560* (C); near Frijoles, *Nelson 11417*, type collection of *L. Nelsonii* (C, W type); Valley of the Pecos, *Wright 341* (G), *Wright 855*, (C, G type, MBG, NY, US); Carlsbad Caverns, *Nelson 11392* (C, MBG, S, W); Mesilla Valley, *Wooton & Standley* in 1907 (F, M, MBG, NY, S). ARIZONA: near Camp Lowell, *Pringle 13622* (MBG); Tucson and vicinity, *Griffiths 2438* (NY), *Greene 5* (G); Sacaton, *Harrison & Kearney 8385* (US); Williams River, *Bigelow* in 1853-54 (NY). Much of the material from southern Arizona is somewhat intermediate between var. *Wrightii* and var. *typicum*. As examples of such plants the following are typical: Marana to Red Rock, Pinal County, *Gillespie 8891* (C, NY, S); Bowie, Cochise County, *Eastwood 8613* (CA).

15b. *LEPIDIUM LASIOCARPUM* var. *rotundum* var. nov.

Plants hirsute-hispid; cauline leaves divided to entire; pedicels much flattened, nearly glabrous; fruits nearly rotund, ca. 4 mm. long, glabrous except for few short marginal hairs. (Planta hirsuto-hispida; foliis caulinis divisis vel integerrimis; pedicellis compressissimis, fere glabris; silicula fere rotunda, ca. 4 mm. longa, pubescente-marginata.) (Plate XVII, fig. 2b.)

Type: Corpus Christi at Causeway, Texas, March 16, 1929, *Tharp 5576*, United States National Herbarium, no. 1468782.

Representative material. TEXAS: Padre Island, *Tharp 5578* (US); Boca Chica, near coast, *Runyon 1394* (US).

The large round fruits of these plants are different from all others of *L. lasiocarpum*. The variety is undoubtedly most closely related to var. *Wrightii*, which it resembles in habit and leaf character, but the leaves and stems are much less hispid, and the fruits are nearly glabrous.

15c. *LEPIDIUM LASIOCARPUM* var. *typicum* nom. nov.

L. lasiocarpum Nutt.; Torr. and Gray, Fl. N. Am. 1: 115. 1838.

L. lasiophyllum Brandege, Proc. Calif. Acad. ser. 2, 1: 207. 1889 (erratum).

L. lasiocarpum subsp. *Wrightii* Thell. Monog. Lepid. 266, in part.

L. lasiocarpum subsp. *Wrightii* var. *pubescens* Thell. Monog. Lepid. 267. 1906, based on *Shockley 9*, from Candelaria, Nevada, a plant that is well within the range of variation of var. *typicum*.

L. Palmeri Wats. Proc. Am. Acad. 24: 39. 1889, based on *Palmer 560*, from Los Angeles Bay, Lower California, agrees quite well with material of var. *typicum* from the coastal region of southern California.

L. lasiocarpum subsp. *Palmeri* (Wats.) Thell. Monog. Lepid. 267. 1906.

Plants hispid, the hairs without pustular bases; fruits from nearly glabrous to quite hispid; leaves variable; pedicels much flattened, usually shorter than fruits and more than twice as broad as thick. (Plate XVII, figs. 2, 2a.)

Southwestern Colorado through southern Utah and Arizona to central and southern Nevada, Mohave and Colorado Deserts and coastal southern California south into Mexico.

Representative material. COLORADO: Naturita, Montrose County, *Payson 264* (F, G, MBG, W). UTAH: La Verkin, *Jones 5183c* (P). ARIZONA: Rodeo, *Jones 25838* (MBG, P); Scottsdale to Granite Reef, *Gillespie 5650* (C, NY, S); Canyon Lake, *Nelson 11213a* (C, MBG, W). NEVADA: Beaver Dam Wash, Lincoln County, *Goodding 2141* (W), approaching var. *georginum*; east of Sparks, *Eastwood & Howell 94* (CA, M); Goldfield, Esmeralda County, *Heller 9609* (NY, S); Candelaria, *Shockley 9*, type collection of *L. lasiocarpum* subsp. *Wrightii* var. *pubescens* (C, S), *Shockley 209* (G). CALIFORNIA: Panamint Mountains, *Coville & Funston 499* (G, NY); Red Rock Canyon, Kern County, *Howell 4940A* (CA); Providence Mountains, *Munz & Harwood 3441* (P, W); Mecca, *Spencer 1758* (G, P); Santa Barbara, *Nuttall, (G type, PA)*; Hueneme Beach, *Munz 9394* (C, P); Ballona Harbor, Los Angeles County, *Abrams 1182* (MBG, P, S); Calexico, *Abrams 3148* (C, F, G, MBG, NY, P, S); San Diego River, *Abrams 3407* (F, G, MBG, NY, P, PA, S). LOWER CALIFORNIA: Los Angeles Bay, *Palmer 560*, type collection of *L. Palmeri* (G type, US). WASHINGTON: without locality, *Vasey 176* (US), possibly an error in labels.

The following collections are examples of the plants with fruits resembling those of *L. dictyotum* although they are not considered sufficiently different to be given nomenclatural recognition: ARIZONA: Oatman, Mohave County, *Harrison & Kearney 7581* (US). CALIFORNIA: Kelso, Mohave Desert, *Jones* in 1906 (P); Palm Springs, *Eastwood 3052* (CA), *Spencer 764* (G, NY, P), *Spencer 1486* (G, P); Magnesia Canyon, *Munz 12006* (C, M, MBG, P); Painted Canyon, *Howell 3540* (CA); 2 miles north of Cargo Muchacho Mountains, Imperial County, *Munz & Hitchcock 12151* (M, MBG, P); San Felipe Creek, San Diego County, *Eastwood 2813a* (CA); Mountain Palm Spring, eastern San Diego County, *Munz & Hitchcock 12101* (C, M, MBG, P). The next four collections are typical of the peculiar form found on the coastal islands which resembles var. *Wrightii* in general habit: Costa Mesa, Orange County, *Munz 12191* (M, MBG, P, S); La Jolla, *Clements & Clements 28* (G, I, MBG, NY, PA), mixed with some *L. nitidum*; San Clemente Island, *Munz 6609* (C, G, P); San Nicolas Island, *Trask* in 1901 (G). Where the ranges of var. *typicum* and var. *georginum* overlap there is marked intergradation of the two, as exemplified by the following collection: UTAH: St. George, *Jones 5110f* (P). ARIZONA: Hermit Creek, Grand Canyon, *Eastwood 8959* (CA). CALIFORNIA: Inyo County,

Black Canyon, White Mountains, *Duran 740* (C, CA, MBG, NY, W); Panamint Mountains, *Hall & Chandler 6954* (P), *Coville & Funston 520* (MBG); Chuckwalla Mountains, *Munz & Keck 4905* (P); Borrego Springs, Colorado Desert, *Jones* in 1906 (P).

15d. *LEPIDIUM LASIOCARPUM* var. *georginum* (Rydberg) comb. nov.

L. georginum Rydberg, Bull. Torr. Bot. Club 30: 253. 1903.

L. lasiocarpum subsp. *georginum* Thell. Monog. Lepid. 267. 1906.

Plants much less harshly pubescent than other varieties, the stems sometimes glabrous or nearly so, usually unbranched at base; cauline leaves entire or toothed; pedicels glabrous on lower side; fruits as in var. *typicum*, but usually glabrous on lower side.

Southern Nevada and adjacent California, Arizona, and Utah.

Representative material. UTAH: Gold Hill, Tooele County, *Jones* in 1891 (P); St. George, *Palmer 41* (NY); valley of Virgin, near St. George, *Parry 19* (F, G, MBG, NY type); La Verkin, *Jones 5185* (MBG, NY, P). NEVADA: Snow Springs, *Goodding 2157* (G, W); Calientes, *Goodding 913* (F, MBG, NY, W); Moapa, *Goodding 2186* (C, G, MBG, W); Las Vegas, *Tidestrom 8609* (F, MBG); Reno, *Jones 3786* (CA, I, MBG, NY, P). CALIFORNIA: White Mountains, Inyo County, *Heller 8215* (CA, F, G, MBG, NY, S); Chuckwalla Valley, Riverside County, *Munz & Keck 4806* (P); White Tanks, Riverside County, *Munz & Hitchcock 12227* (C, M, MBG, P). ARIZONA: Littlefield, Mohave County, *Jones* in 1926 (P, S) intermediate between var. *georginum* and var. *Wrightii*.

16. *LEPIDIUM NITIDUM* Nutt.; Torr. and Gray, Fl. N. Am. 1: 116. 1838.

Annual, erect to spreading, 0.5–4.5 dm. tall, puberulent or pubescent near inflorescence, pubescent to glabrous below; basal leaves 3–10 cm. long, deeply pinnatifid, the 3–7 pairs of segments about as wide as rachis, entire or toothed, cauline leaves smaller, pinnatifid to entire, sometimes as much as 3–4 mm. broad; racemes in fruit rather loose, many-flowered; pedicels densely puberulent, very much flattened; sepals ovate, ca. 1 mm. long, villose to glabrous on back, often purplish; petals spatulate, 1–1.5 mm. long, or minute; stamens usually 6, the shorter sometimes vestigial or lacking; fruits ovate or ovate-elliptic to nearly orbicular, usually glabrous but sometimes with the margins minutely pubescent, nerves not prominent, the surfaces smooth and shining, convex below, somewhat concave above, the margins upturned, ca. 4 (2.5–6) mm. long, 3.5 (2.5–5) mm. broad, the apex with notch 0.2–0.5 mm. deep, the sinus usually very narrow, but sometimes moderately open; style lacking or essentially so; cotyledons incumbent. (Plate XV, fig. 6.)

KEY TO VARIETIES OF *L. NITIDUM*

Silicles with distinct divergent apices prolonged beyond

the general oval contour of the fruits 16b. *L. nitidum*
var. *oreganum*

Silicles with apices parallel or slightly divergent, but never distinctly prolonged beyond the contour of the fruit.

- Stems densely pubescent, almost cinereous; fruits minutely pubescent on margins 16c. *L. nitidum*
var. *Howellii*
- Stems glabrous to fairly densely pubescent, but not cinereous; fruits glabrous 16a. *L. nitidum*
var. *typicum*

16a. *LEPIDIUM NITIDUM* var. *typicum* comb. nov.

L. nitidum Nutt.; Torr. and Gray, Fl. N. Am. 1: 116, 668. 1838.

L. leiocarpum Hook. and Arn. Bot. Beech. 324. 1840. The original description and the type collection by Douglas leave no doubt that this is synonymous with *L. nitidum*.

L. nitidum var. *insigne* Greene, Fl. Franciscana 274. 1891. This is merely a large fruited specimen; plants of this nature are fairly common, but there appears to be no particular region where they are constant.

Silicles without distinct divergent apices, 3.5–6 mm. long, glabrous; stems glabrous to moderately pubescent.

Klickitat County, Washington, southwestern Oregon, fairly common throughout California at lower altitudes except in the desert region; into Lower California.

Representative material. WASHINGTON: Rockland, *Suksdorf 845* (C, F, MBG, WSC). OREGON: near Selma, *Henderson 5728* (CA, MBG, W); Umpqua Valley, *Howell* in 1881 (F, NY). CALIFORNIA: without definite locality, *Douglas*, type collection *L. leiocarpum* (G), *Nuttall*, part of type collection? (G); Cherokee Mine, Butte County, *Heller 13096* (CA, F, G, I, MBG, PA); Marysville, Sutter County, *Heller 7562* (F, G, MBG, NY, PA, S); near Santa Rosa, *Heller & Brown 5054* (F, G, I, MBG, NY, P, PA, S, W); Byron Springs, Contra Costa County, *Eastwood 3775* (CA, G, NY); Stanford University, *Baker 310* (C, F, G, MBG, NY, P, S, W, WSC); 3 miles south of Blackwell's Corner, Kern County, *Howell 5897* (CA); Santa Barbara, *Nuttall* (G type, NY); east side Santa Rosa Island, *Munz & Crow 11698* (P); Avalon, Santa Catalina Island, *Trask* in 1901 (MBG, NY); Pasadena, *Jones 3036* (CA, I, MBG, NY, P); San Bernardino, *Parish & Parish 47* (F, G, MBG); San Clemente Island, *Trask 347* (NY), San Diego, *Orcutt 23* (F, G, MBG). A collection from near San Bernardo, Monterey County, *Howell 5990* (CA, M) approaches var. *Howellii*. TEXAS: North Comanche, *Eggert* in 1900 (MBG) (introduced).

Large fruited specimens, called var. *insigne* by Greene, are exemplified by the following collections: north base of Tehachapi Pass, Kern County, *Munz 8973* (P); north of Lebec, Kern County, *Jones* in 1921 (P); 8 miles north of Oroville, Butte County, *Heller 11177* (C, CA, F, G, I, MBG, NY, PA).

Another variation in fruit size that appears to be a more constant condition is found in material from southern California, particularly from Point Loma and from Claremont, for example: Claremont, *Munz 2070, 11061* (P); sea cliffs, Point Loma, San Diego County, *Bartram 476* (PA), *Eastwood 2536* (CA, G). In these collections, and on other plants from the same localities,

the fruits are only about 2.5 mm. in length. However, because of the great variation in fruit size in this species, these plants are not being proposed as a new entity.

16b. *LEPIDIUM NITIDUM* var. *oreganum* (Howell ex Greene) comb. nov.

L. oregonum Howell; Greene, Fl. Franciscana 274. 1891, in part.

L. oregonum Howell, Pac. Coast Pl. Coll. of 1887, without description.

L. strictum var. *oreganum* Robinson, Gray Syn. Fl. N. Am. 1¹: 129. 1895.

Fruits 3.5 mm. long or longer, with distinct acute divergent apices; stems glabrous or inconspicuously pubescent.

Southern Oregon and California; wherever the ranges of *L. nitidum* and *L. dictyotum* overlap.

Representative material. OREGON: Rogue River Valley, Josephine County, *Howell 627* (G), *Howell* in 1887, type collection (F, MBG, NY, US, WSC). CALIFORNIA: Hornbrook, Siskiyou County, *Smith* in 1913 (CA); Woodland, Yolo County, *Blankinship* in 1893 (G); Byron Springs, Contra Costa County, *Eastwood 3766a* (CA); Stockton, *Stanford 110* (W); near Tracy, *Howell 5784* (CA, F, M); 15 miles southeast of Merced, *Howell 4113* (CA); 3 miles east of Los Banos, *Abrams 10752* (P); 1-5 miles southeast of San Benito, *Howell 6018* (CA, M, P); 6 miles southeast of Stratford, Kings County, *Howell 5792* (CA, M); Cholame, San Luis Obispo County, *Eastwood & Howell 2010* (CA).

As Mr. J. T. Howell (Leaf. West. Bot. 1: 92. 1934) has so well shown, these plants are intermediate in character between *L. nitidum* and the *L. latipes*-*L. dictyotum*-*L. oxycarpum* complex. They are found only where the ranges of *L. nitidum* and *L. dictyotum* overlap, and Mr. Howell has been successful in finding these two species growing nearby whenever he has found the plants of suspected hybrid nature (var. *oreganum*). Because they are so much more similar to *L. nitidum* than to *L. dictyotum*, they are here assigned varietal rank as indicated until such time as they may be proved to be of hybrid origin.

16c. *LEPIDIUM NITIDUM* var. *Howellii* var. nov.

Fruits 3.5-5 mm. long, without divergent acute apices, usually with minutely pubescent margins; stems densely pubescent, almost cinereous; racemes numerous, dense. (Silicula 3.5-5 mm. longa, sine apicibus acutis divergentibus, margine pubescente; caulibus pubescentissimis, fere cinereis; racemis numerosis, densis).

Type: Near Mohave, Kern County, April 24, 1905, *Heller 7760* (C, type; also F, G, MBG, NY, PA).

Mohave Desert of eastern Kern County and adjacent San Bernardino County, California.

Material seen. 5 miles northeast of Kramer, San Bernardino County, *Craig, Newsom, & Hilend 115* (P); 5 miles south of Mohave, Kern County, *Munz*

10082 (P); near Mohave, Johnston in 1920 (P), 8 miles west of Ricardo, Howell 4995 (CA, M); 35 miles west of Wasco, Munz 10104 (P), approaching var. *typicum*.

That the writer was not the first to notice the distinctive character of these plants is shown by the labels of the plants collected by J. T. Howell, which bear the identification "L. nitidum var.?" The dense pubescence of the stems, the densely crowded racemes, and the ciliate-margined fruits would seem to indicate that these plants are more than chance ecological variants.

17. *LEPIDIUM DICTYOTUM* Gray, Proc. Am. Acad. 7: 329. 1868.

A low densely pubescent annual 2-14 (20) cm. tall, somewhat spreading; basal leaves usually pinnatifid with 2-5 pairs of linear lobes, these sometimes cleft, the rachis and lobes 1-1.5 (2.5) mm. broad, cauline leaves mostly entire, 1-2.5 mm. broad; racemes various, many-flowered, usually lax and equal to, or longer than, rest of stem, or sometimes quite compacted; pedicels 1.5-3.5 mm. long, flattened, sometimes reflexed, but never truly sigmoid; sepals 0.75-1 mm. long, pubescent on back; petals usually lacking or sometimes as much as 1.25 mm. long; stamens 4 (6); fruits 3.25-4.5 mm. long, 2.25 mm. broad, glabrous to hirtellous or densely hirsute when mature, prominently reticulate, typically ovate in outline, the apices sometimes prolonged considerably and then only the portion below stigma truly ovate, apex winged, prolonged 0.3-1 (2) mm. beyond stigma, the wings usually rounded and more or less parallel, or slightly divergent, but sometimes the apices acute or acuminate and divergent, sinus acute; style lacking; cotyledons incumbent. (Plate XVI, fig. 1.)

There is great variation in the species in nearly all characters, especially in the length of the apices of the fruit, in the angle of the sinus, and in the amount of pubescence on the silicles, as well as in the degree of compactness of the inflorescence and even in the general habit. J. T. Howell, in his field studies of the species, has made careful note of this variation, and several of his collections, such as no. 4111, were made to illustrate it. There is a tendency for some of the material, which has been named var. *acutidens*, to have much longer apices on the fruits than are found on most of the plants. Indeed, some of this material appears to be intermediate between *L. dictyotum* and *L. latipes*, whereas other plants appear to be intermediate between *L. dictyotum* and *L. oxycarpum*. The exact status of such material is not clear, but it may be separated as follows.

KEY TO VARIETIES OF *L. DICTYOTUM*

- | | |
|---|---|
| Winged apices of fruit less than 1 mm. long, usually rounded or obtuse to acute | 17a. <i>L. dictyotum</i>
var. <i>typicum</i> |
| Winged apices over 1 mm. long, acuminate | 17b. <i>L. dictyotum</i>
var. <i>acutidens</i> |

17a. *LEPIDIUM DICTYOTUM* var. *typicum* nom. nov.*L. dictyotum* Gray, Proc. Am. Acad. 7: 329. 1868.*L. dictyotum* var. *macrocarpum* Thell. Monog. Lepid. 271. 1906. The type collection, from near Livermore, Greene in 1889, is not at all unusual; the fruits are scarcely 4 mm. long.*L. acutidens* var. *microcarpum* Thell. Monog. Lepid. 271. 1906. The type, Jones 3061 from San Diego, is really intermediate between var. *typicum* and var. *acutidens*, but surely cannot be given recognition.

Racemes usually quite compactly flowered; fruits mostly ca. 3.5 mm. long, the apices rounded or at most no more than acute, scarcely divergent. (Plate XVI, fig. 1.)

In alkaline soil; region of Great Salt Lake, Utah, Columbia River region of Idaho, south central Washington, inland Oregon, western Nevada, and fairly common at lower altitudes throughout California except in the true desert region.

Representative material. UTAH: Granger, Salt Lake County, Garrett in 1921 (NY). NEVADA: Carson City, Watson 125 (G, NY); Empire City, Jones 3787 (CA, MBG, NY, P). IDAHO: Weiser, Jones 6154 (MBG, P, S); near Lewiston, Heller & Heller 2991 (MBG, S, PA). WASHINGTON: near Sprague, Sandberg & Leiberg 138 (C, F, G, NY, P); Rockland, Suksdorf 844 (F, G, MBG, NY, WSC). OREGON: near Lexington, Leiberg 1 (C, F, G, MBG, NY, P, PA, S, W); The Dalles, Sheldon S10210 (G, MBG, NY, P, WSC). CALIFORNIA: east of Livermore, March 10, 1889, Greene, type collection of *L. dictyotum* var. *macrocarpum* (NY), Howell 10872 (CA, NY); 5 miles east of Salinas Valley, Monterey County, Howell 5979 (CA, M); 15 miles southwest of Merced, Howell 4111 (CA, F, G, MBG, NY); Coalinga, Eastwood 13463 (CA); Hanford, Eastwood 3857 (CA, G, NY); near Bakersfield, Heller 7594 (C, F, G, MBG, NY, PA, S); Mohave Desert, Pringle in 1882 (F, G, MBG, PA); San Bernardino, Parish & Parish 794 (C, F, G, MBG, PA); Temecula, Jones in 1882 (NY, P). The following two collections approach var. *acutidens*: San Diego, March 14, 1882, Jones 3061, type collection *L. acutidens* var. *microcarpum* (CA, MBG, NY, P, PA, S, WSC); San Diego, Cleveland in 1882 (S). The species has been reported from the Coachella Valley, and several collections from that area labelled "*L. dictyotum*," have been seen. This material is here referred to *L. lasiocarpum*.

17b. *LEPIDIUM DICTYOTUM* var. *ACUTIDENS* Gray, Proc. Am. Acad. 12: 54. 1877.*L. acutidens* (Gray) Howell, Fl. Northwest Am. 1¹: 64. 1897.*L. oxycarpum* var. *acutidens* Jepson, Man. Fl. Pl. Cal. 441. 1925.*L. oreganum* Howell; Greene, Fl. Franciscana 274. 1891, in large part, except for the Howell specimen.

Racemes from loosely to densely flowered; fruits mostly over 4 mm. long, with acuminate, divergent, winged apices mostly over 1 mm. long.

With var. *typicum* in Washington, Oregon, and California, but much less common. In California var. *acutidens* seems to range farther northward than does var. *typicum*.

Representative material. OREGON: Ashland, *Howell 3849* (NY). CALIFORNIA: without definite locality, *Kellogg & Harford 39* (CA, MBG, NY, S); near Yreka, *Greene 725* (F, G type, MBG); Colusa, *Heller 13542* (F, I, MBG, NY, S); Nortonville, *Rose 33041* (F, M, NY, P, S); lower San Joaquin, *Bioletti* in 1892 (C, G); near Livermore, *Howell 10873* (CA, F, MBG, S); Compton, *MacClatchie* in 1897 (CA); 1 mile south of Perris, Riverside County, *Howell 4783* (CA); San Diego, *Pringle* in 1882 (NY). Two collections from alkali flats, Umatilla, Oregon, *Howell*, May 8, 1882 (F, MBG, NY, S), and May 10, 1882 (NY, PA), have unusually large fruits and might easily be mistaken for *L. latipes*. The pubescence and reticulation of the fruits of this material are so similar to the corresponding features of the silicles of *L. dictyotum* that it seems the most logical treatment to include it here. The following series shows a continuous gradation from *L. dictyotum* var. *typicum* to the most extreme form of var. *acutidens*: *Howell 5979*, *Eastwood 13463*, *Jones 3061*, *Rose 33041*, *Kellogg & Harford 39*, *Bioletti* in 1892, *Greene 725*, and *Howell*, May 8 and 10, 1882.

18. LEPIDIUM OXYCARPUM Torr. and Gray, Fl. N. Am. 1: 116, 668. 1838.

Slender annual, erect to diffuse, 5–20 cm. tall, from glabrate to moderately pubescent; leaves 2–6 cm. long, the basal ones often with 2–4 pairs of linear lobes, rachis 1–3.5 mm. broad, cauline leaves usually linear, entire, 1–3 mm. broad; pedicels (at least on older fruits) 3–5 (2.5) mm. long, slender, reflexed or even somewhat sigmoid; sepals *ca.* 0.5 mm. long, all alike and ovate, or two of them narrower, sparsely pilose on back; petals *ca.* 0.5 mm. long, somewhat spatulate, or much reduced, frequently lacking; stamens usually 4, silicles finely reticulate, glabrous, ovate but with the apex widened because of the divergent wings, 2.5–3.5 mm. long, 2–2.5 mm. broad, the winged apices acute or acuminate, less than 1 mm. long, widely divergent, the sinus from barely acute to obtuse; style lacking; cotyledons incumbent. (Plate XVII, fig. 1.)

Saline soil chiefly in the San Francisco Bay region; also collected at Victoria, British Columbia.

Representative material. CALIFORNIA: without locality, *Douglas*, type collection (G, NY), *Coulter* (F, G, NY, PA); Woodland, Yolo County, *Blankinship* in 1893 (G); Vallejo, *Greene* in 1874 (G); Petaluma, *Howell 10924* (CA, P, S); 9 miles south of Sonoma, *Keck 996* (G, P, S); 4.5 miles north of San Rafael, Marin County, *Howell 10919* (CA, M, NY, P, S); Alameda County, *Michener & Bioletti* in 1893 (MBG, NY, P); San Francisco Bay, 4 miles west of Decoto, *Howell 4652* (CA, MBG, NY); Berkeley, *Greene* in 1881 (MBG, S); near Livermore, *Howell 10874* (CA, F, MBG); Alviso, Santa Clara County, *Bioletti* in 1892 (W); Redwood City, San Mateo County, *Keck 1401* (CA, CI, E, LW); 7 miles from Hollister on road to Gilroy, San Benito County, *Howell 11021* (CA). BRITISH COLUMBIA: vicinity of Victoria, *Macoun* in 1893 (G, MBG, NY, US).

In fruit character, *L. oxycarpum* is approached only by *L. dictyotum* var. *acutidens*. However, the fruit lacks pubescence in the former species, the sinus is more open and the winged apex is shorter. The pedicels are more slender, some of them nearly always being over 3 mm. long.

19. *LEPIDIUM LATIPES* Hook. Ic. Pl. 1: pl. 41. 1837.

L. Brownii Heller, Pl. Calif. 1902. n. 5429 (without description). Racemes more elongate than normal, otherwise typical material.

L. Brownii Heller; Thell. Monog. Lepid. 267. 1906, in synonymy.

A low, spreading annual with branches 3–10 (25) cm. long, very densely pubescent to short canescent-hirsute; leaves as much as 14 cm. long, basal ones, at least, pinnatifid into 3–10 pairs of linear, entire or dissected divisions, the rachis and segments 1–6 mm. broad; racemes short, 2–5 (12) cm. long, very much congested, pedicels much widened and flattened, 2–3 mm. long, ascending; sepals oblong-ovate, *ca.* 1.25 mm. long, densely pubescent; petals oblong-obovate, 2–4 mm. long, quite pubescent on back, also ciliate-laciniate; stamens 4 (in specimens examined); silicles short-hirsute or hispidulous, oblong-ovate, 5.5–7 mm. long, *ca.* 3.5 mm. broad, with acute winged apices, *ca.* 2 mm. long, parallel, or slightly divergent, the sinus very narrow; cotyledons incumbent. (Plate XVI, fig. 2.)

Saline soil and vernal pools at lower elevations, Humboldt County to San Diego County, California.

Representative material. CALIFORNIA: without locality, *Douglas*, type collection (G, NY); Spruce Grove, near Harris, Humboldt County, *Tracy 1644* (C); Willows, Glenn County, *Eastwood 10215* (CA); 4 miles east of Williams, Colusa County, *Ferris 532* (MBG, NY, P, S); Dashiells, Mount Sanhedrin, Lake County, *Eastwood 12814* (CA); Petaluma, *Eastwood 10451* (CA); near Black's, Yolo County, *Heller & Brown 5429*, collection listed as *L. Brownii* (F, G, MBG, NY, P, PA, S, US, W); Camp 68, Martinez, *Brewer 985* (C, MBG, S, WSC); salt marshes, Alameda County, *Brandegee* in 1890 (G); Stockton, *Stanford 837* (G, P, S); French Flat, Tuolumne County, *Ferris 1555* (CA, NY); 10 miles northwest of Hollister, San Benito County, *Howell 11001* (CA); Carpenteria, Santa Barbara County, *Brewer 273* (C, G); Avalon, Santa Catalina Island, *Trask* in 1901 (MBG, NY); near Santa Monica, *Hasse* in 1891 (G, NY); San Diego, *Cleveland 794* (G), April 3, 1882, *Pringle* (F, NY, PA), April 26, 1882, *Pringle* (G, MBG), *Jones 3060* (CA, MBG, NY).

20. *LEPIDIUM FLAVUM* Torr. Pacif. R. R. Rep. 4: 67. 1857.

A glabrous, yellowish-green, prostrate or ascending annual, the branches 3–30 cm. long; basal leaves spatulate to oblong-lanceolate or lanceolate, 2–5 cm. long, rather irregularly lobed to pinnatifid, cauline more cuneate, somewhat smaller, the lobes less deep (leaves frequently entire or with somewhat serrate teeth on upper third only); flowers in crowded to comparatively loose racemes, sometimes quite densely crowded and seemingly capitate or umbellate; pedicels terete or but slightly flattened; flowers pale to bright sulfur-yellow; petals about 2 mm. long; stamens 6; silicles oval, 2–4 mm. long, 1.5–3.5 mm. broad, usually with distinct winged divergent apices, prominently reticulate, glabrous, but with scale-like projections arising mostly from the nerves; style 1–1.5 mm. long; cotyledons incumbent. (Plate XVI, fig. 3.)

KEY TO VARIETIES OF *L. FLAVUM*

- Silicles 2-3 mm. long, 1.5-2.2 mm. broad; styles usually half the length of the fruit or more 20a. *L. flavum*
var. *typicum*
- Silicles 3-4.5 mm. long, 3-3.5 mm. broad; styles not half so long as fruit 20b. *L. flavum*
var. *felipense*

20a. *LEPIDIUM FLAVUM* var. *typicum* nom. nov.

L. flavum Torr. Pacif. R. R. Rep. 4: 67. 1857.

Sprengeria flava (Torr.) Greene, Leaflets Bot. Obs. and Crit. 1: 198. 1906.

Sprengeria Watsoniana Greene, Leaflets Bot. Obs. and Crit.

1: 199. 1906. Type, *Watson 126*; see discussion of this and following synonyms below.

Sprengeria minuscula Greene, Leaflets Bot. Obs. and Crit. 1: 199. 1906. Type, *Coville & Funston 734*.

Lepidium flavum Torr. var. *apterum* Henrard and Thell. Medel. van Rijks Herb. Leid. 34: 1. 1918. Type, *Heller 7675*.

Silicles variable, but seldom over 2.5 mm. long; the apices various, but divergent; scales on fruits numerous. (Plate XVI, figs. 3, 3a.)

Mohave Desert of California north to Humboldt and Elko counties of Nevada, south into Lower California.

Representative material. CALIFORNIA: without locality, *Bigelow (G)*, *Freemont (G)*; Mohave River, *Palmer* in 1876 (F, MBG); Los Angeles County, Lancaster, *Elmer 3653* (C, CA, G, MBG, NY, S, US); Kern County, Kramer, *Heller 7675*, type collection *L. flavum* var. *apterum* (C, G, MBG, NY, PA, S), 2-5 miles north of Rosamund, *Abrams 11164* (F, NY, S); Barstow and vicinity, *Hitchcock 12255* (MBG, P), *Parish 9664* (C, G, MBG, S); Inyo County, Shepherd Canyon, Argus Mountains, *Coville & Funston 734*, type collection *Sprengeria minuscula* (G, NY), mouth of Black Canyon, White Mountains, *Duran 538* (CA, F, MBG, NY, P, S, US, W); Benton, Mono County, *Jones* in 1897 (NY, P). NEVADA: Las Vegas, *Goodding 2298* (C, G, MBG, NY, W); Amargosa Desert, Nye County, *Jones* in 1907 (P); Humboldt Lake, *Jones 3001* (CA, MBG, NY, P, S, US); Humboldt Valley, *Watson 126*, Type collection *Sprengeria Watsoniana* (G, NY). NEW MEXICO: near Albuquerque, *Coulter* in 1897 (G). Apparently this last collection is mislabelled or represents a chance introduction of the species. *L. flavum* has not since been reported from New Mexico.

The writer can see no good reason for recognizing the species and the variety cited in synonymy above. *Sprengeria Watsoniana* Greene differs in no significant way from typical material of *L. flavum*; leaf characters (upon which this species was founded, largely) vary greatly in this group, and in the isotype of Greene's species at the Gray Herbarium the basal leaves are divided almost to the midvein, that is, they are normal for the species.

Sprengeria minuscula Greene is apparently only an ecological variant, with small fruits such as are frequently found on plants that have grown in unusually dry soil.

Lepidium flavum var. *apterum* was founded on a collection of plants with fruits almost devoid of apical wings. With the

material at the disposal of the authors it is not surprising that Heller's collection was considered sufficiently unusual to be named. However, there seems to be little constancy in the length or divergence of the apices of the fruits in *L. flavum*, and other plants of Heller's collection have more "normal" wings. It is not unusual to find plants that exhibit great variation in the wings of the different fruits. Jones' collection of May 13, 1927, from Lone Pine, includes specimens that are not unlike those of the type of var. *apterum*.

20b. *LEPIDIUM FLAVUM* var. *felipense* var. nov.

Silicles nearly orbicular, 3-4 mm. long, 3-3.5 mm. broad, with very small winged apices, almost devoid of scales; style only 1-1.5 mm. long. (Silicula fere orbiculata, 3-4 mm. longa, 3-3.5 mm. lata, apice leviter emarginata, fere illepidata; stylo 1-1.5 mm. longo). (Plate XVI, fig. 3b.)

Type: San Felipe, California, May-Oct. 1898, *Purpus*, Pomona College Herb. no. 142; collection also at the Rocky Mountain Herbarium, University of Wyoming.

Known only from the San Felipe region of the Coachella Valley of southern California.

Material seen. CALIFORNIA: San Felipe, *Purpus* in 1898 (P type, W), *Brandege* in 1895 (C); canyon west of Borrego Springs, *Jones* in 1906 (P); Iron Wood Well, Colorado Desert, *Brandege* in 1905 (C); Cuyamaca, San Diego County, *Brandege* in 1894 (C).

The unusual size and shape of the silicles, their lack of scales, and the short styles are the outstanding characters of this variety.

21. *LEPIDIUM FREMONTII* Wats. Bot. King Exped. 30. pl. 4, figs. 3-4. 1871.

Suffruticose, glabrous and glaucous perennials 4-8 dm. tall, freely branched; leaves 3-10 cm. long, mostly pinnatifid into few (3-9) lobes, the lobes 1-3 mm. broad, upper leaves sometimes entire, linear, 2-3 mm. broad; inflorescence much branched, somewhat leafy; sepals 1.5-2 mm. long, glabrous; petals ca. 3 mm. long, white; filaments glabrous; silicles broadly ovate to obovate, 4-7 mm. long and nearly as broad, with wide winged margins, faintly nerved; styles 0.4-0.8 mm. long; cotyledons incumbent. (Plate XVII, fig. 6.)

Deserts of northwestern Arizona, extreme southwestern Utah, southern Nevada, and southern California.

Representative material. ARIZONA: road from Chloride to the river, Coconino County, *Eastwood 18336* (CA, US); Yucca, Mohave County, *Jones 3916* (CA, F, G, NY, P, US, WSC). UTAH: St. George and vicinity, *Parry 17* (F, G, MBG, NY, P, PA). NEVADA: Trinity Mountains, Pershing County, *Watson 120* (G, NY); Candelaria, *Jones 3738* (CA, G, MBG, NY, P, S, US, W); near Las Vegas, *Tidestrom 8601* (F, MBG, NY). CALIFORNIA: near Lone

- Stems mostly less than 4.5 dm. tall, usually branched rather profusely all the way to top 22n. *L. montanum*
var. *angustifolium*
- Cauline leaves averaging nearly 4 mm. broad or more; if narrower, at least some of them lobed or divided.
- Cauline leaves entire, or at most deeply crenate-dentate, some of them 6-10 mm. broad 22f. *L. montanum*
var. *heterophyllum*
- Cauline leaves usually more deeply divided, but if not, then less than 6 mm. broad. Plant entirely glabrous; stems slender, the cauline leaves often with variously lobed divisions 22g. *L. montanum*
var. *glabrum*
- Plant with some pubescence, either on basal leaves or on parts of inflorescence, or on both 22j. *L. montanum*
var. *Jonesii*
- Stems pubescent below inflorescence as well as above (sometimes very obscurely so). Filaments densely bearded 22e. *L. montanum*
var. *papilliferum*
- Filaments glabrous, or at least not bearded. Cauline leaves nearly all entire. Upper cauline leaves linear to elliptic or oblanceolate, some, at least, 4 mm. broad 22l. *L. montanum*
var. *Eastwoodiae*
- Upper cauline leaves linear or nearly so, mostly less than 3 mm. broad 22k. *L. montanum*
var. *alysoides*
- Cauline leaves, many of them, lobed, toothed, or divided. Leaves mostly basal, cauline few, far apart, much reduced, some entire; divisions of basal leaves from ovate to obovate. Stems practically leafless, plants usually less than 2 dm. tall; basal leaf-divisions nearly obovate 22h. *L. montanum*
var. *alpinum*
- Stems sparingly leafy; plants usually 2 dm. or more tall; basal leaf-divisions mostly ovate to oblong 22i. *L. montanum*
var. *tenellum*
- Leaves rather evenly distributed, upper more numerous than in the two preceding varieties, not greatly reduced, divisions of basal leaves narrower than ovate; stems usually quite densely (though minutely) pubescent. Cauline leaves divided nearly as deeply as basal leaves; plants with several to many stems of equal length; low, usually not over 1.5 dm. tall 22b. *L. montanum*
var. *typicum* f. *wyomingense*

Cauline leaves not divided so deeply as basal ones; plants usually with central more sturdy stem, usually over 1.5 dm. tall.

Plants quite woody at base, the stems one to several but quite sturdy; cauline leaves simple or but few-lobed; fruiting racemes usually 6 cm. long or more.

Stems glabrous or but very sparsely pubescent below inflorescence; often tortuous between nodes

22j. *L. montanum*
var. *Jonesii*

Stems definitely pubescent from base to inflorescence, not tortuous.

Upper cauline leaves linear or nearly so, mostly less than 3 mm. broad; stems usually freely branched below

22k. *L. montanum*
var. *alyssoides*

Upper cauline leaves linear to elliptic or oblanceolate, some at least 4 mm. or more broad; stems 4.5-10 dm. tall, mostly simple below

22l. *L. montanum*
var. *Eastwoodiae*

Plants not woody at base, stems usually slender; upper cauline leaves often several-lobed and nearly pinnatifid; fruiting racemes but 2-4 (5-6) cm. long.

Stems usually densely hirtellous-puberulent, although sometimes rather obscurely so, the hairs very slender and terete, 5-8 times as long as thick; plants of Nevada and western Utah mostly

22c. *L. montanum*
var. *canescens*

Stems with pubescence of different kind than above.

Stems beset with very short, thick hairs, or appearing almost mealy or scurfy under the lens; the hairs 2-3 times as long as thick

22a. *L. montanum*
var. *typicum*

Stems densely short puberulent-papillose, hairs not many times longer than thick; appearing somewhat glaucous or powdery; plants of northwestern Arizona

22d. *L. montanum*
var. *canescens* f.
cinereum

22a. *LEPIDIUM MONTANUM* var. *typicum* nom. nov.

L. montanum Nutt.; Torr. and Gray, Fl. N. Am. 1: 116, 669. 1838.

L. corymbosum Hook. and Arn. Bot. Beech. 323. 1840. Type, American Falls of Snake River, *Tolmie*. A specimen of the type collection has been seen. It is good representative material of this variety.

L. utaviense Regel, Acta Hort. Petrop. 1: 92. 1871. Grown from seeds collected by Roehl in Utah. From the description this segregate would seem to belong here.

L. montanum var. *stenocarpum* Thell. Monog. Lepid. 210. 1906. The type, *Palmer 279*, from Blackfoot, Idaho, is good representative material of this variety.

L. scopulorum f. *nanum* Thell. Monog. Lepid. 211. 1906. The type, *Parry 23*, from Wyoming, is not significantly different and certainly is not related to *L. scopulorum*.

L. brachybotryum Rydberg, Bull. Torr. Bot. Club 34: 427. 1907. The type, *Goodding 1075*, from Juab, Utah, can be referred here. The short styles and racemes, and rounded pods mentioned as distinctive are common to the typical variety.

L. philonitrum Nelson and Macbride, Bot. Gaz. 56: 474. 1913. Type collected at Falk's store, Canyon County, Idaho, *Macbride 32*. The authors were apparently contrasting the plant with var. *alyssoides* and var. *Jonesii*, rather than with typical *L. montanum* with which it agrees quite well.

Biennials or perennials from rather simple or branched caudex, plants usually with central main stem and several laterals of nearly same length, forming rounded plant 2-3 (1-4) dm. tall, sparsely to densely pubescent with thick papillary or clavate hairs 2-4 times as long as thick; basal leaves pinnate or pinnately divided, the divisions usually again lobed or incised, cauline leaves reduced, upper entire or lobed to parted; racemes mostly 2-4 cm. long, many-flowered; petals white; filaments glabrous; fruits ovate, 2.5-3 mm. long, glabrous.

Northwestern Colorado, southwestern Wyoming, northern Utah and southern Idaho, chiefly in valleys.

Representative material. COLORADO: South Park, *Wolf & Rothrock 623* (G). Without definite locality: Snake country, *Tolmie*, probably type collection *L. corymbosum* (from American Falls, Idaho?) (G), plains of Rocky Mountains to western Washington, *Nuttall* (G, NY, PA type). WYOMING: South Pass, *Parry 23*, type collection of *L. scopulorum* f. *nanum* (G); Gros Ventres Pass, *Hayden* in 1860 (MBG). UTAH: Weber Valley, Summit County, *Watson 121* (G, NY, US); 16 miles up Salina Canyon, Sevier County, *Jones 5412b* (P, US); 24 miles west of Delta, Millard County, *Maguire & Beecraft 3923* (C); Juab, Juab County, *Goodding 1075*, type collection of *L. brachybotryum* and really intermediate between var. *typicum* and var. *canescens*, but closer to the former (C, F, G, MBG, NY type, P, W, US); Provo, Utah County, *Decker 26-9* (NY); near Logan Air Port, *Muenschler & Maguire 2331* (C, MBG, P, W); near Grantsville, Tooele County, *Garrett 2868* (NY). IDAHO: Soda Springs, Bannock County, *Payson & Payson 1704* (CA, G, MBG, NY, W); Blackfoot, Bingham County, *Jones* in 1909 (P), *Palmer 279*, type collection of *L. montanum* var. *stenocarpum* (C, CA, F, G, MBG, NY, W); Idaho Falls, Bonneville County, *Nelson 10044* (C, MBG, W); Falk's Store, Canyon County, *Macbride 32*, type collection of *L. philonitrum* (C, F, G, MBG, NY,

S, US, W type, WSC). NEVADA: Fish Creek, *Brandegee* in 1885 (G). Several collections, of which the following are representative, are more or less intermediate between var. *typicum* and var. *canescens*. UTAH: Morgan, Morgan County, *Jones* in 1919 (P); Sevier Bridge, Millard County, *Jones* 1896 (F, NY, P). NEVADA: Wells, *Jones* in 1901 (P). *Tidestrom* 1209 (US), west of Ephraim, Wasatch Mountains, San Pete County, Utah, is very unusual in that the cauline leaves are almost entire, as in var. *alpinum*, yet it has the pubescence of var. *typicum*. A collection from South Park, Colorado, *Porter* 473 (MBG), is intermediate in character between this variety and var. *alyssoides*, being like the latter in general habit, but with the pubescence of var. *typicum*.

22b. *LEPIDIUM MONTANUM* var. *TYPICUM* f. *wyomingense* f. nov.

Much like the typical variety, but the stems several, about equal, seldom over 1.5 dm. tall, plants biennial or perennial; basal leaves pinnately divided, the divisions lobed or parted, cauline leaves somewhat reduced, scarcely any entire, often divided and with the divisions lobed; sepals slightly pilose usually; petals usually pale lemon. (Similissimum *L. montano* var. *typico*, sed caules complures, aequales; 0.5–1.5 dm. alta; petala fere lutea?) (Plate XVI, fig. 4c.)

Type: Laramie, Albany County, Wyoming, June 16, 1896. *Nelson* 1947 (W type, G, MBG, NY).

Southern Wyoming, and adjacent Colorado and Utah in the high plains region.

Representative material. COLORADO: Pitkin, Gunnison County, *Underwood & Selby* 409 (NY). UTAH: Willow Spring Pass, *Jones* in 1891 (P). WYOMING: Fish Hatchery, *Buffum* 93 (W); Cottonwood Canyon, Laramie, *Nelson* 1569 (G, W); Laramie, *Nelson* 1947 (G, MBG, NY, W), *Nelson* 221 (NY), *Macbride* 2381 (MBG); Bitter Creek, *Nelson* 3106 (P, W); Sand Creek, Albany County, *Nelson* 7035 (G, I, MBG, NY, P, W); Red Buttes, *Nelson* in 1903 (W); Laramie Plains, *Osterhout* in 1897 (F, P); Near Rock Springs, Sweetwater County, *Payson & Payson* 4306 (W); Henry's Fork, Uintah Mountains, *Goodding* 1190 (G, MBG, P, W) intermediate between this and var. *alpinum*; near Flackert's Ranch, *Merrill & Wilcox* 728 (G, NY, W) of same nature as *Goodding* 1190.

22c. *LEPIDIUM MONTANUM* var. *canescens* (Thell.) comb. nov.

L. scopulorum f. *canescens* Thell. Monog. Lepid. 211. 1906. The type, *Baker* 1190, from Eagle Valley, Nevada, is certainly not the same as *L. scopulorum* Jones which is herein treated as a variety of *L. montanum*.

L. albiflorum Nelson and Kennedy, *Muhlenbergia* 3: 138. 1908. The type, *Brown* 66, from Spanish Spring's Valley, Washoe County, has not been seen. However, the description can leave little doubt as to the nature of the plant and this is the only form of such nature occurring in that portion of Nevada.

Usually biennial, possibly perennial, sometimes blooming the first year, about 3 dm. tall, round-topped, whole plant except flowers and fruits sparsely to densely villose and almost canescent, the hairs slender; basal leaves pinnately divided, the divisions entire and about 1 (1.5) mm. broad, hirsute; cauline leaves

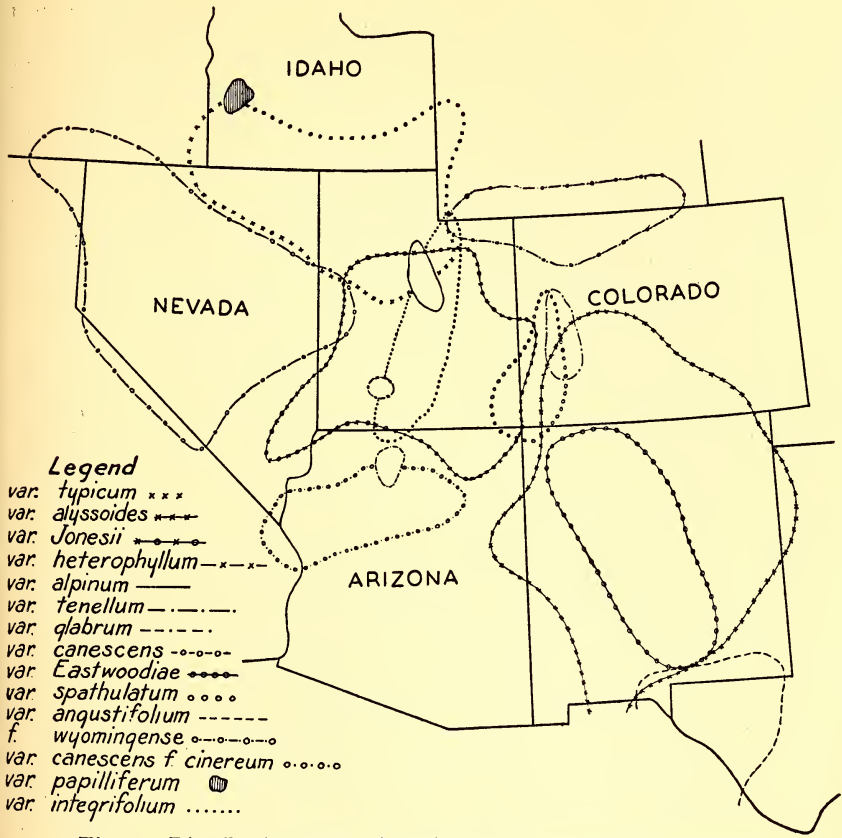


Fig. 1. Distribution map of varieties of *Lepidium montanum*.

reduced, rather few (4-7), some entire, but some, at least, lobed and parted or divided, the divisions about 1 mm. broad; racemes short and many-flowered, mostly 2-4 cm. long; calyx conspicuously pilose; filaments glabrous, fruits ovate, *ca.* 2.5 mm. long, glabrous. (Plate XVI, fig. 4e.)

Central and northern Nevada and adjacent Utah, California, and Oregon, usually on sagebrush flats. Characterized chiefly by the pubescence and low habit.

Representative material. UTAH: Emmington, *Jones* in 1880 (P); Old Dugway, Tooele County, *Jones* in 1891 (P); Wendover, Tooele County, *Van Dyke* in 1930 (CA). NEVADA: Pah Ute Mountains, *Watson 123* (G); near Wendover, Elko County, *Eastwood & Howell 356* (CA), *Jones 25313* (MBG, P); Battle Mountains, Elko County, *Kennedy 3077* (S); between Imlay and Battle Mountains, *Eastwood & Howell 160* (CA, M); Reno, Washoe County, *Jones* in 1897 (P), Steamboat Creek, *Stretch 111* (NY); Carson City, Ormsby County, *Jones* in 1897 (P), *Anderson 142, 230* (G, US); Eagle Valley, *Baker 1190*, type collection (G, MBG, NY, P, US), *Baker 1264* (P), Empire City, *Jones 3003* (CA, MBG, NY, P, US).

The following collections are much less pubescent than the material cited above and perhaps are worth nomenclatural status. However, although some of the plants are practically glabrous, the few hairs that are present are of the type found in this variety. In general habit also the plants resemble var. *canescens*. OREGON: near McDermitt, *Cusick 2023* (C, F, G, MBG, W, WSC); Narrows, Harney County, *Peck 5259* (F, G); Denio, Harney County, *Train 38* (US), *Griffiths & Morris 400* (US). CALIFORNIA: north of Gazelle, Siskiyou County, *Heller in 1925* (S); Grenada Station, Siskiyou County, *Heller 8068* (F, G, MBG, NY, PA, S); three miles south of Grenada, Siskiyou County, *Wheeler 3639* (M, LW); near Yreka, Siskiyou County, *Green 844* (G, MBG); between Gazelle and Grenada, Siskiyou County, *Heller 14610* (MBG, NY, S, US); Pitt River south of Alturas, Modoc County, *Austin 336* (C); Alturas, Modoc County, *Howell 12182* (CA); Black Lake, Mono County, *Duran 3347* (C, CA, F, MBG, S, US, W, WSC).

22d. *LEPIDIUM MONTANUM* var. *CANESCENS* f. *CINEREUM* f. nov.

Stems, leaves, and sometimes fruits densely cinereous papillose-puberulent and pulverulent, the hairs about twice as long as thick; sepals pilose on back; filaments (and usually fruits) glabrous; fruits 3–3.5 mm. long. (Caulis foliaque valde cinereo-puberulenta et pulverulenta; sepala glabra; filamenta glabra; silicula 3–3.5 mm. longa.)

Type: collected on sagebrush flat, Seligman, Arizona, Aug. 14, 1935, *Hitchcock 2866*, University of Montana (Herb. No. 23,674).

Northwestern Arizona at elevation of 1000–2100 meters; occasional in adjacent California.

Representative material. ARIZONA: 18 miles below Black Falls, Little Colorado, *Ward in 1901* (US), hairs several times as long as thick; Pinedale, Navajo County, *Hough 106* (US), near Leupp, *Peebles 9530* (US); 50 miles south of Lee's Ferry, Coconino County, *Jones in 1890* (P), between Williams and Grand Canyon, *Degener 4842* and *4530* (NY), Seligman, *Eastwood 5929* (CA), *Hitchcock 2866* (M), west of Cameron, *Hanson 101* (W); Hackberry, Mohave County, *Jones in 1903* (P); road to Peach Springs from Kingman, *Eastwood 18670* (CA, US); 20 miles west of Ashfork, *Hitchcock 2864* (M); 20 miles east of Ashfork, *Hitchcock 2865* (M). CALIFORNIA: Barnwell, New York Mountains, San Bernardino County, *Ferris & Bacigalupi 8106* (C, P, S), *Munz 13708* (M, P); Fourth of July Canyon, New York Mountains, *Jaeger in 1932* (CI, P).

This form is about the same as var. *canescens* except that the hairs are more like papillae and much shorter. One collection, *Eastwood 18670*, has densely pubescent fruits, the only specimen of *L. montanum* seen by the writer with such fruits.

22e. *LEPIDIUM MONTANUM* var. *PAPILLIFERUM* Henderson, Bull. Torr. Bot. Club 27: 342. 1900.

L. papilliferum (Henderson) Nelson and Macbride, Bot. Gaz. 56: 474. 1913. The authors cite their number 1068 as the type, although it is identical with *Henderson 4121*, the type of *L. montanum* var. *papilliferum*.

Entire plant densely papillose-puberulent, the hairs appearing somewhat flattened; sepals pilose on back; petals white and

very conspicuous; filaments bearded with same type of pubescence as on stem. Otherwise as in var. *typicum*.

Idaho; the only collections seen are from Canyon County, and from near Boise.

Material seen. IDAHO: near Nampa, Canyon County, *Henderson 4121*, type collection (G, S, US, WSC), *Mulford* in 1892 (G, MBG, NY), *Nelson & Macbride 1068* (W); New Plymouth, Canyon County, *Macbride 91* (C, F, G, MBG, NY, S, US, W, WSC); Emmet, Canyon County, *Macbride 880* (C, F, G, MBG, NY, P, S, US, W, WSC); Boise, *Jones* in 1917 (P), *Gageby* in 1916 (W).

22f. *LEPIDIUM MONTANUM* var. *heterophyllum* (Wats.) comb. nov.

L. integrifolium var. *heterophyllum* Wats. Am. Nat. 9: 268. 1875.

L. scopulorum Jones, Proc. Calif. Acad. ser. 2, 5: 625. 1895, in part. A name proposed for Watson's entity when Dr. B. L. Robinson pointed out that *L. heterophyllum* was preoccupied as a specific name. Jones interpreted this group by what he supposed were the same plants from the Wahsatch Mountains (whence came *Watson 122*), but which are in reality different, belonging to var. *alpinum*.

Whole plant glabrous, or with very few hairs chiefly on basal leaves; stems few from rather heavy root-crown, rather sturdy, 2-3 dm. tall; leaves glabrous or with very few hairs, basal deeply serrate to incised and lobed, mostly over 1 cm. broad, cauline somewhat reduced and more frequently entire, 6-10 mm. broad.

Known only from the type locality, near Cedar City, Utah, but apparently from higher elevations than var. *integrifolium* and not from saline soil.

Material seen. UTAH: without definite locality, *Parry 14* (US); near Cedar City, Iron County, *Parry 16* (F, G type, MBG, PA), *Jones 5204t* (P), *Cottam, Stanton & Harrison 3968* (P).

The peculiar leaves and glabrosity of this plant are the chief characters of significance. It is closest to var. *glabrum* from Grand Canyon, but the leaves and branches are very different. The plants are taller and different in aspect from either var. *alpinum* or var. *tenellum*, the other somewhat similar groups.

22g. *LEPIDIUM MONTANUM* var. *glabrum* var. nov.

Entire plant glabrous, suffrutescent; stems diffusely branched, as much as 6-7 dm. tall, ending in exceedingly slender branchlets; whole plant quite leafy, the basal leaves as much as 4 cm. broad, from deeply lobed to divided, the divisions sometimes cleft to parted; lower cauline leaves not greatly reduced; racemes few-flowered, leafy, on very slender branchlets; silicles ovate-rotund, but little over 2 mm. long on material seen.

(Planta glabra 4–7 dm. alta; caulibus ramosissimis, ramis gracilibus; folia glabra, basilaria ad 4 mm. lata; racemis paucifruktiferis, gracilissimis; silicula ovato-rotundata, ca. 2.5 mm. longa).

Type: Hermit Trail, Grand Canyon, Arizona, June 18, 1916, *Eastwood 5826* (CA). Known only from the Grand Canyon and the San Francisco Mountains.

Material seen. ARIZONA: Grand Canyon, Yavapai County, *Wooton* in 1892 (US); Trail from Grand View, Grand Canyon, *Eastwood 3596* (CA); north rim Grand Canyon, *Eastwood & Howell 975* (CA); Hermit Trail, Grand Canyon, *Eastwood 5826* (CA type, G); rim of Grand Canyon, *Hitchcock* in 1915 (US); Grand Canyon along river, *Toumey 54* (S); San Francisco Mountains, *Toumey 55* (US).

The glabrosity of this plant, the unusual leaf form, the capillary branches, and the small, nearly round fruits are outstanding.

22h. *LEPIDIUM MONTANUM* var. *ALPINUM* Wats. Bot. King Exp. 29. 1871.

L. scopulorum Jones, Proc. Calif. Acad. ser. 2, 5: 625. 1895, in large part, according to Jones' notations on herbarium material.

L. heterophyllum Jones, Zoë 3: 284. 1893, proposed as a name for *L. montanum* var. *alpinum* Wats., later changed to *L. scopulorum*.

Plants somewhat spreading at base, usually about 1.5 (2.5) dm. tall, the stems slender, rather numerous, sparsely puberulent, leaves mostly basal, parted or more frequently divided, the divisions variously lobed or entire, ovate to obovate, cauline leaves few, usually but 2–3 per stem, much reduced; racemes very short, 2–3 cm. long, flowers closely crowded, the pedicels ascending, but occasionally sigmoid; sepals and filaments glabrous; silicles about 3 mm. long or less, glabrous. (Plate XVI, fig. 4f.)

Known only from the cliffs and ledges of the Wahsatch and Oquirrh Mountains of Utah.

Material seen. UTAH: Wahsatch Mountains, *Watson 122* (G type, NY, US); Little Cottonwood Canyon, Wahsatch Mountains, *Jones* in 1907 (C, CA, MBG, NY, P, S); Lake Blanche, Wahsatch Mountains, *Clemens* in 1911 (CA, NY, P, W), *Treakle 320* (P), *Jones* in 1895 (MBG, P, S); Alta, Wahsatch Mountains, Salt Lake County, *Jones 1270* (F, NY, P, S); gorge near Alta, *Leonard 212* (NY); Oquirrh Mountains, *Jones* in 1893 (NY); without definite locality, *Ward 209* (PA).

The variety is striking because of the nearly leafless, sparsely pubescent stems, and large divisions of the basal leaves; the habitat and habit are also unusual.

22i. *LEPIDIUM MONTANUM* var. *tenellum* (Williams) comb. nov.

L. tenellum Williams, Bull. Torr. Bot. Club 61: 259. 1934. *Payson 1033*, from Gunnison, Colorado, type.

Plants more or less suffrutescent and somewhat decumbent at base, sparingly puberulent to practically glabrate; leaves mostly basal, parted or divided, the divisions entire or sometimes lobed, cauline leaves mostly 3-5, very much reduced, the upper entire; sepals slightly pilose on back usually; styles about 0.5 mm. long; fruits about 3 mm. long, glabrous.

From the canyons of west central Colorado.

Material seen. COLORADO: rock crevices near railroad, Black Canyon of Gunnison, Gunnison County, *Payson 1033* (W type); Cimarron, Montrose County, *Jones* in 1890 (P), *Jones* in 1925 (P); Glenwood Springs, Garfield County, *Osterhout 2579* (NY), *Diehl* in 1899 (P), *Payson 1193* (MBG, W); Glenwood, *Eastwood 7202* (CA); Meeker, Rio Blanco County, *Robbins 7139* (W); without definite locality, *Meredith* in 1895 (PA).

In all material seen the stems tend to be decumbent, although the type is more slender than most of the material referred here. This variety is very similar to var. *alpinum*, but the plants are somewhat taller and the stems are more leafy. There is the possibility, of course, that it is only a minor variation of Watson's variety.

22j. LEPIDIUM MONTANUM var. *Jonesii* (Rydberg) comb. nov.

L. Jonesii Rydberg, Bull. Torr. Bot. Club 29: 233. 1902.

L. alyssoides var. *Jonesii* (Rydberg) Thell. Monog. Lepid. 208. 1906.

L. montanum var. *alyssoides* Jones, Zoë 4: 266. 1893, in large part, particularly plants of Utah.

L. tortum Williams, Bull. Torr. Bot. Club 61: 260. 1934. The type, *Goodding 2281*, from Las Vegas, Nevada, has some pubescence on the stem, otherwise it is not unusual.

L. Crandallii Rydberg, Bull. Torr. Bot. Club 34: 427. 1907. The type, collected at Palisades, Colorado, *Crandall 131*, is more or less intermediate between var. *Jonesii* and var. *alyssoides*, but is representative of the intergrades where the two varieties overlap in range.

L. alyssoides var. *stenocarpum* Thell. Monog. Lepid. 208. 1906. The type, *Baker 12*, Montrose, Colorado, is really intermediate between var. *Jonesii* and var. *alyssoides*. The same can be said for this synonym as for *L. Crandallii*.

Plants suffrutescent, 1.5-3.5 dm. tall, with one or more stems, branched from base to top, often quite crooked or tortuous, usually glabrous below inflorescence, sometimes puberulent; basal leaves divided, the divisions dissected or parted, cauline leaves numerous, the lower mostly with 2-5 deep lobes, the upper simple or less deeply lobed, usually with few hairs; fruiting racemes 3-7 cm. long; sepals glabrous to slightly pilose on

back; filaments glabrous; fruits glabrous, 2.5–4 mm. long. (Plate XVI, figs. 4, 4a, 4b.)

Southern and central Utah and adjacent Colorado, Arizona, and Nevada, chiefly at medium altitudes.

Representative material. COLORADO: Palisades, Mesa County, *Crandall 10* (G); Grand Junction, *Jones* in 1895 (MBG, P), *Macbride & Payson 698* (W); Montrose, *Payson 653* (G, W). UTAH: San Juan River, near Bluffs, *Rydberg & Garrett 9972* (NY); vicinity of Moab, *Harrison 5965* (MBG), *Rydberg & Garrett 8426* (NY); west of Vernal, Uintah County, *Williams 612* (CA, MBG, NY, W); Green River, *Jones* in 1895 (CA, MBG, NY, PA); near Emery, *Jones 5445a* (C, MBG, NY, P, US); Cainville, Wayne County, *Jones 5696b* (NY, P, US); Kaibab, *Cottam 4327* (P); near St. George, *Parry 18* in 1874 (F, G, MBG, NY), *Jones 1636* (CA, F, G, NY type, P, PA, S, US, W, WSC). ARIZONA: Segi Canyon, Navajo Indian Reservation, *Clute 89* (W); 5 miles northeast of Holbrook, *Ward* in 1901 (US) approaching f. *cinereum*; Mokiah Pass, *Palmer 39* (MBG, NY). NEVADA: Horse Spring, Clark County, *Jones 5066* (MBG, NY, P, S); Las Vegas, *Gooding 2281*, type collection of *L. tortum* (C, G, MBG, NY, W type).

The following collections are more or less intermediate between var. *Jonesii* and var. *alyssoides*, and were made where the ranges of the two varieties overlap. COLORADO: near Delta, Delta County, *Osterhout* in 1926 (P); Grand Junction, *Eastwood 5200* (CA); Palisades, *Crandall 131* (NY, W); Montrose, *Baker 12*, type collection of *L. alyssoides* var. *stenocarpum* (C, G, MBG, NY, P, US, W). Gallup-Shiprock road, New Mexico, *Nelson 10377* (C, M, MBG, NY, W). *Jones'* collection of 1895 from Grand Junction, Mesa County, Colorado, is more or less intermediate between the varieties *Jonesii* and *alpinum*.

This variety differs from var. *Eastwoodiae* in its lower form and by having a more branched habit, divided leaves, and tortuous branches. It is something like var. *typicum* and var. *canescens* in leaf form, but is much more woody and less pubescent.

22k. *LEPIDIUM MONTANUM* var. *ALYSSOIDES* (Gray) Jones, Zoë 4: 266. 1893, in large part.

L. alyssoides Gray, Pl. Fendl. (Mem. Am. Acad. Nat. Sci. 4: 10. 1849) 10. 1849.

L. alyssoides var. *minus* and var. *polycarpum* Thell. Monog. Lepid. 208. 1906. The type collections, by *Porter* in 1872, at South Park, Colorado, and by *Engelmann* in 1874, near Canyon City, Colorado, are unusual plants, but both are pubescent and are not deemed of sufficient difference to merit recognition. The variety *polycarpum* is especially interesting because of the crowded condition of the racemes. If it is not a chance variation as is suspected, it would seem to be worth some recognition.

Plants suffrutescent with one or more freely branched stems 2.5–5 dm. tall, puberulent; basal leaves nearly bipinnatifid, lower cauline leaves sometimes lobed to parted, but mostly entire, upper ones always entire, averaging 2–3 mm. broad and 2–4 cm. long; calyx glabrous or slightly pilose; filaments and fruits glabrous.

Southern Colorado, New Mexico, and adjacent Texas, at lower altitudes, but intergrading with var. *angustifolium* in the south.

Representative material. TEXAS: Rainwater Creek, *Wright 1324* (G, MBG, PA, US). NEW MEXICO: without locality, *Wright 1325* (C, G, PA, US); Copper Mines, Grant County, *Thurber 1113* (G, NY); Gray, Lincoln County, *Skehan 48* (C, F, G, MBG, NY, P, US, W); Roswell, *Earle & Earle 254* (MBG, NY, P, US); south of Atarque de Garcia, Valencia County, *Wooton* in 1906 (NY); between San Miguel and Vegas, *Fendler 46* (C, G type, MBG); Tres Piedras, Taos County, *Earle 55* (MBG, NY). ARIZONA: Holbrook, *Zuck* in 1896 (MBG, NY, US). COLORADO: near Bent's Fort, *Fremont 480* (G, MBG, NY); Pueblo, *Greene* in 1873 (F, G, NY); east of Florence, Fremont County, *Clokey 4141* (CA, F, MBG, P, PA, S, US, W); Arkansas Valley, Fremont County, *Jones* in 1878 (P), near Canyon City, *Jones 766* (P) and *Engelmann* in 1874 (MBG), the last two numbers cited by Thellung under var. *polycarpum*; South Park, *Porter* in 1872 (G), type collection of var. *minus* Thell.; Poncho Pass, Chaffee County, *Bethel, Willey & Clokey 4133* (CA, F, M, MBG, NY, P, PA, S, W, US); Paradox, *Payson 2324* (CA, G, MBG, NY, W); Grand Junction, *Eastwood 5162*, approaching var. *alpinum* (CA, S). UTAH: Glenwood, *Ward 160* (MBG) between var. *alyssoides* and var. *Jonesii* as is the collection from Sevier Valley near Richfield, *Ward 253* (F, G, MBG).

The following collections from Texas are representative of the intergrades between var. *angustifolium* and var. *alyssoides*: Canyon City, *Palmer 12527* (C, MBG, W), *Reverchon 3713* (MBG, NY); Pecos, *Palmer 34020* (MBG, NY, PA); Barstow, *Tracy & Earle 24a* (C, F, G, MBG, NY, US); El Paso, *Jones 4199* (CA, F, G, NY, P, PA, S, WSC); Huecho Mountains, east of El Paso, *Hitchcock 2869* (M).

221. *LEPIDIUM MONTANUM* var. *Eastwoodiae* (Wooton) comb. nov.

L. Eastwoodiae Wooton, Bull. Torr. Bot. Club 25: 258. 1898. *Wooton 673*, collected in the White Mountains, Lincoln County, New Mexico, is the type.

Plants suffrutescent, with one or more stems 4.5–10 (3) dm. tall, the stems unbranched or nearly so below the inflorescence, puberulent to glabrous, basal leaves parted to divided, the divisions usually toothed or lobed, cauline leaves, at least the lower sometimes parted or divided, the upper usually entire, narrowly lanceolate to oblanceolate, some at least, over 4 (4–7) mm. broad; sepals, filaments, and fruits glabrous.

Mountain ranges of central New Mexico.

Representative material. NEW MEXICO: Organ Mountains, Modoc Mine, *Standley* in 1906 (MBG); Organ Mountains, *Wooton* in 1902 (P, W), *Vasey 93* (G), Van Pattens, *Wooton* in 1899 (G, NY, US), Dripping Springs, *Munz 13265* (P); White Mountains, Lincoln County, *Wooton 673* (MBG, NY, US type); Mancos River, San Juan County, *Hutchinson 3830* (E); north of Magdalena, Socorro County, *Eggleston 16196* (US); near Albuquerque, Bernalillo County, *Palmer 31158* (MBG); Jemez Valley, Jemez Mountains, *Nelson & Nelson 236* (C, W); Sandia Mountains, *Ellis 72* (MBG, NY, US).

These plants are maintained as a variety with some doubt. Because of their greater height, wider leaves and unbranched stems they can usually be distinguished from var. *alyssoides*. The variety *Eastwoodiae* appears to intergrade with both var. *Jonesii* and var. *spathulatum* in its northern limits. Typical of intergrades with the last variety are the following: UTAH: Hammond Canyon, Elk Mountains, *Rydberg & Garrett 9574* (NY); near Bluffs, *Rydberg & Garrett 9971* (NY, W); near Wilson Mesa, Grand County, *Rydberg & Garrett 8391* (G, NY). COLORADO: Weber Canyon, *Eastwood* in 1892

(C, MBG); Rio Mancos, Montezuma County, *Brandeggee 1227* (C); Naturita, *Payson 589* (F, G, MBG, S, W).

22m. *LEPIDIUM MONTANUM* var. *spathulatum* (Robinson) comb. nov.

L. scopulorum var. *spathulatum* Robinson, Gray Syn. Fl. N. Am. 1¹: 125. 1895.

L. spathulatum Vasey, ex Robinson, Gray Syn. Fl. N. Am. 1¹: 125. 1895, as synonym. Not *L. spathulatum* Philippi.

Thelypodium crenatum Greene, Pittonia 4: 20. 1899.

L. crenatum (Greene) Rydberg, Bull. Torr. Bot. Club 33: 141. 1906. Based on Baker, Earle & Tracy 394, which as Rydberg showed, is really a *Lepidium*, and is the same in all respects as Robinson's plant.

L. Vaseyana Thell. Monog. Lepid. 211. 1906, a name proposed for the group as a *species*, since *L. spathulatum* was pre-occupied.

Erect plants; stems 3.5–6 dm. tall, glabrous below, puberulent above, basal leaves from serrate-crenate to merely three-notched at apex, from ovate-lanceolate to obovate, 10–20 mm. broad, the blades as much as 7–8 cm. long, narrowed to petioles nearly or quite as long, stem leaves simple or more rarely crenate at apex, reduced, yet usually 5–15 mm. broad, practically sessile, glabrous or glabrate; inflorescence rather dense and rounded, with clusters of racemes at ends of branches; sepals glabrous or sparsely short pilose; stamens 6; silicles about 3 mm. long.

Southwestern Colorado and adjacent Utah.

Representative material. UTAH: head of Bear River, (possibly Colorado?) *Vasey 32* (US); Moab, *Rydberg & Garrett 8471* (NY, W); La Sal Mountains, *Rydberg & Garrett 8561* (NY, W). COLORADO: west of Grand River, Rocky Mountains, *Vasey 51* (G type, MBG, US); Mesa Verde National Park, *Nelson & Nelson 304* (C, W), *Bader 290* (W), *Bethel* in 1921 (W), *Haas 29* (W); near Mancos, *Baker, Earle & Tracy 394*, type collection *L. crenatum* (C, F, G, MBG, US, W), *Munz 13044* (M, P), *Piper 3938* (W); Montrose, *Payson 936* (G, W); Paradox, *Walker 337* (G, S, US, W); Paonia, Delta County, *Eggleston 14593* (US), *Osterhout 4511* (NY); between Meeker and Craig, *Osterhout 2616* (NY, P, W). Doubtfully included here is a collection from Moab, Utah, *Jones* in 1891 (P, S), which is more or less intermediate between var. *spathulatum* and var. *Jonesii*.

This variety is characterized by the size of the plant, by the clusters of racemes at the branch ends, and by the serrate-crenate leaves. It probably is more closely related to var. *Eastwoodiae* or to var. *integrifolium* than to either var. *typicum* or var. *Jonesii*.

22n. *LEPIDIUM MONTANUM* var. *angustifolium* var. nov.

Plants erect, suffrutescent, with main stem and numerous lateral branches, glabrous below inflorescence, 3–7 dm. tall; basal leaves pinnately parted or divided, sometimes slightly

pubescent, cauline leaves very numerous, linear, mostly 1.5–2 mm. (1–3.5) broad, and 4–5 (3–6) cm. long, nearly all entire, occasionally a few incised; racemes long, many-flowered, pubescent on rachis and pedicels; sepals glabrate or slightly pilose; filaments glabrous; fruits averaging about 3 mm. long, glabrous. (Planta erecta, sub racemis glabra, 3–7 dm. alta, foliis basilariis partitis vel divisis, caulinis linearibus, 1.5–2 (1–3.5) mm. latis, 4–5 (3–6) cm. longis, plerisque integerrimis.)

Extreme southwestern Texas and adjacent New Mexico.

Type: Fabens, Texas, April 10, 1930, *M. E. Jones 25835*, Pomona College Herb. no. 178824. Collection also at California Academy of Sciences and Missouri Botanical Garden.

Representative material. TEXAS: Garvin, Wise County, *Palmer 30493* (MBG); 70 miles below El Paso, *Wright 17* (C, G, MBG, NY); 2 miles north of Pecos, *Hitchcock 2867* (M); 40 miles east of Pecos, *Hitchcock 2868* (M); Van Horn, *Jones 28110* (MBG, P); El Paso, *Palmer 31108* (MBG, PA); Canutillo, July 1, 1911, *Bronson* (CA, F); between Fabens and Yoleta, *Ferris & Duncan 2360* (CA, MBG, S); Fabens, *Jones 25835* (CA, MBG, P); Amarillo, *Reverchon* in 1902, possibly wrong locality? (MBG). NEW MEXICO: Carlsbad Caverns, *Nelson 11364* (M, W).

220. *LEPIDIUM MONTANUM* var. *integrifolium* (Nutt.) comb. nov.

L. integrifolium Nutt.; Torr. and Gray, Fl. N. Am. 1: 116. 1838.

L. zionis Nelson, Bot. Gaz. 42: 50. 1906. Type, *Jones 5411*, typical in all respects.

L. utahense Jones, Bull. Torr. Bot. Club 8: 70. 1881, Zoë 4: 266. 1893. *Jones 1821*, the type, is the same as Nuttall's plant, the nature of which was unknown to Jones.

Stems somewhat decumbent, from a thick caudex, rather densely puberulent; leaves entire, thick and fleshy, elliptic to elliptic-obovate, 4–15 mm. broad, the basal with petioles as long as blade, sparingly puberulent to glabrate; sepals somewhat pilose on back; stamens 6 (2); silicles nearly 4 mm. long. (Plate XVI, fig. 4d.)

South central Utah from Sevier County northward to the Bear River, at medium altitudes, in saline soil only. Possibly in Arizona?

Material seen. Without definite locality: *Palmer 37* in 1877 (MBG, NY, US); Rocky Mountains, "plains toward the Columbia," *Nuttall* (G type, NY, PA); Bear River, *Vasey* in 1868 (US). UTAH: Carter, Uintah County, *Jones* in 1896 (P); Vermilion, *Jones* in 1894 (P), *Jones 5631a* (MBG, NY, P); Richfield, *Ward* in 1875 (G), *Jones 5411*, type collection of *L. zionis* (C, MBG, NY, P, US, W type); Glenwood, Sevier County, *Ward 217* (G, MBG, S, PA, US); Milford, Beaver County, *Jones 1821*, type collection of *L. utahense* (F, G, MBG, NY, P type). ARIZONA (?): Ft. Verde, *Mearns 309* (NY). WYOMING: Fossil Station, *Letterman 120* (G, US).

The variety *integrifolium* is outstanding because of the large fruits (although no larger than occasionally found in plants of

var. *Jonesii*), and because of the thick, fleshy, entire leaves. It is surely one of the best marked varieties in the species, but since the flower and fruit characters are the same as those of other forms of *L. montanum*, and since there is intergradation with var. *spathulatum*, it does not seem best to maintain the group as a distinct species.

23. *LEPIDIUM NANUM* Wats. Bot. King Rep. 30. pl. 4, figs. 5, 7. 1871.

Caespitose, matted perennials, 3–6 cm. tall; leaves densely crowded, obovate, 2–5 mm. long, 3-lobed at apex, with winged petioles, conspicuously ciliate and somewhat pubescent; inflorescence of 2–5 flowers, the axis concealed by leaves, fruiting pedicels 2–5 mm. long; sepals *ca.* 1 mm. long, minutely pubescent on back; petals pale cream or white (?), about twice length of sepals; stamens 6, filaments glabrous; silicles glabrous, ovate-elliptic, *ca.* 3.5 mm. long, 2 mm. broad, barely notched at apex; styles *ca.* 0.5 mm. long, cotyledons incumbent (“accumbent” according to Watson’s description). (Plate XVI, fig. 7.)

Known only from extreme northeastern Nevada; apparently growing on dry gravelly knolls.

Material seen. NEVADA: locality somewhat uncertain, Nobe Valley, *Engelmann* in 1859 (MBG); Holmes Creek Valley, Sept. 1868, *Watson 127* (G type, NY, US); Spencemont (should be Sprucemont, Elko County?), *Jones* in 1905 (MBG, NY, P); Elko County, near Halleck Station, *Wheeler* in 1871 (G), Cobre, May 22, 1906, *Jones* (NY, S), June 16, 1906, *Jones* (P), June 26, 1907, *Jones* (P).

The habit of these plants is entirely different from that of all other North American species. It is more suggestive of *Draba* than of *Lepidium*.

24. *LEPIDIUM JAREDII* Brandegee, *Zoë* 4: 398. 1894.

Annual, 1–6 dm. tall, simple to diffusely branched, from nearly glabrous below to fairly villose-canescens; leaves lanceolate, 3–10 cm. long, 0.5–1 cm. broad, mostly entire, some with few teeth; racemes 5–20 cm. long, loosely flowered; pedicels terete, *ca.* 1 cm. long, spreading to sigmoid; sepals yellow, oblong-spatulate, pilose on back, *ca.* 2.5 mm. long; petals *ca.* 3 mm. long, sulfur-yellow; stamens 6; silicles ovate, 3–4 mm. long and as broad near base; styles 0.5–1 mm. long. (Plate XVI, fig. 5.)

Known only from collections from northeastern San Luis Obispo County and south central Fresno County (but range probably continuous through Kings County), California.

Material seen. CALIFORNIA: San Luis Obispo County, Estrella, *Jared* (S), hills above the Carrizo Plains, May, 1893, *Jared*, type collection (CA), 16 miles south of Soda Lake, Carrizo Plain, *Ferris 9122* (S), 18 miles south of Soda Lake, *Keck & Clausen 3157* (CI, C, M, S), east side of Soda Lake, *Keck & Clausen 3138* (CI, M, S); 20 miles northeast of Corcoran, Fresno County,

Winblad in 1935 (CA). With the exception of the two collections by Jared, all material seen was collected in 1935, the collectors all reporting this relative of the *L. montanum* group to be fairly plentiful in the limited area where it occurs.

25. *LEPIDIUM THURBERI* Wooton, Bull. Torr. Bot. Club 25: 259. 1898.

L. alyssoides Gray, as treated by Robinson, Syn. Fl. N. Am. 1¹: 125. 1895, in part.

L. montanum Nutt. as treated by Thell. Monog. Lepid. 208. 1906, in part.

Rank growing annuals 1-6 dm. tall, stems freely branched, the plant more or less rounded, canescent-hirsute to papillose and villose-pilose, the longer hairs usually flattened, the shorter often clavate or papilliferous; basal leaves 3-6 cm. long, petiole, pinnatifid, with 3-8 pairs of segments, these usually lobed to parted, the ultimate divisions linear to obovate, apiculate, cauline leaves somewhat reduced, pinnatifid or the upper sometimes entire; racemes many-flowered; sepals 1-1.5 mm. long, glabrous to pilose; petals white, 2-3 mm. long; stamens 6, filaments glabrous; silicles glabrous, ovate to nearly orbicular, 2-3 mm. long, 2-2.5 mm. broad, narrowly wing-margined near apex, with very shallow notch; style 0.3-0.5 mm. long; cotyledons incumbent. (Plate XVII, fig. 4.)

Extreme southwestern New Mexico; Cochise, Santa Cruz, Pima, and Yavapai counties, Arizona; south into Mexico, and possibly in California.

Representative material. NEW MEXICO: Lava, Socorro County, *Wooton 672*, type collection (MBG, NY, US); "Sonora or New Mexico," *Thurber 323* (G, NY); Valley of Coppermine Creek, Grant County, *Wright 854* (G, MBG, NY); Mangas Spring, *Metcalfe 117* (C, CA, G, MBG, NY, P, S); Florida Mountains, Luna County, *Mulford 1048* (MBG, NY); Lordsburg, Hidalgo County, *Jones 25840* (MBG, P). ARIZONA: Douglas, *Goodman & Hitchcock 1228* (CA, F, MBG, NY, S); Cochise, *Jones 28111* (CA, MBG, P); Miller Canyon, Huachuca Mountains, *Jones 24839* (CA, G, MBG, NY, P); Tucson and vicinity, *Thornber 372* (C, MBG, NY, P, S); Prescott and vicinity, *Eastwood 8845* (CA), *Wolf 2380* (CA, G, S), *Rusby 518* (F, M, MBG, NY). CALIFORNIA: Barstow Hills, Mohave Desert, *Spencer 50* (PA); Marsh Hot Springs, near Santa Rosa, Sonoma County, *Holman* in 1884 (US). It is strongly suspected that the Holman collection, and possibly the Spencer collection as well, were erroneously reported from California; at least it appears that if *L. Thurberi* occurs in that state at all, it will be found on the Mohave Desert, but certainly not within hundreds of miles of Sonoma County.

There are two minor variations apparent in the species as it occurs in Arizona. Plants from near Tucson have the upper leaves entire or practically so, and plants from Yavapai County lack the papillose or clavate hairs, the pubescence which is present being more slender than on other specimens of the species. However, neither of these variations is considered sufficiently distinct or significant to merit nomenclatural distinction.

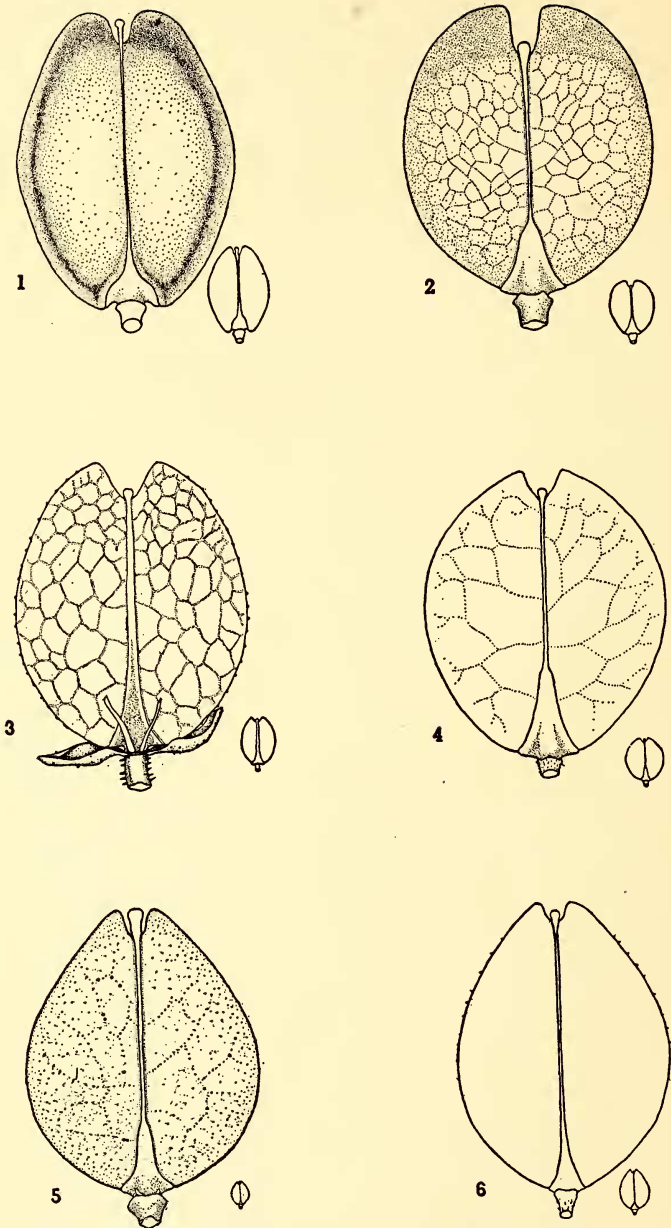


PLATE XIV. United States species of *Lepidium*; upper surface of mature silicles. Small outline drawings $\times 2$; other drawings indefinitely enlarged. Fig. 1. *L. sativum* L. Fig. 2. *L. densiflorum* Schrad. var. *Bourgeauanum* (Thell.) C. L. Hitchcock. Fig. 3. *L. pubescens* Desv. (*L. reticulatum* Howell). Fig. 4. *L. oblongum* Small. Fig. 5. *L. sordidum* Gray. Fig. 6. *L. ruderale* L. (drawn from material from Germany).

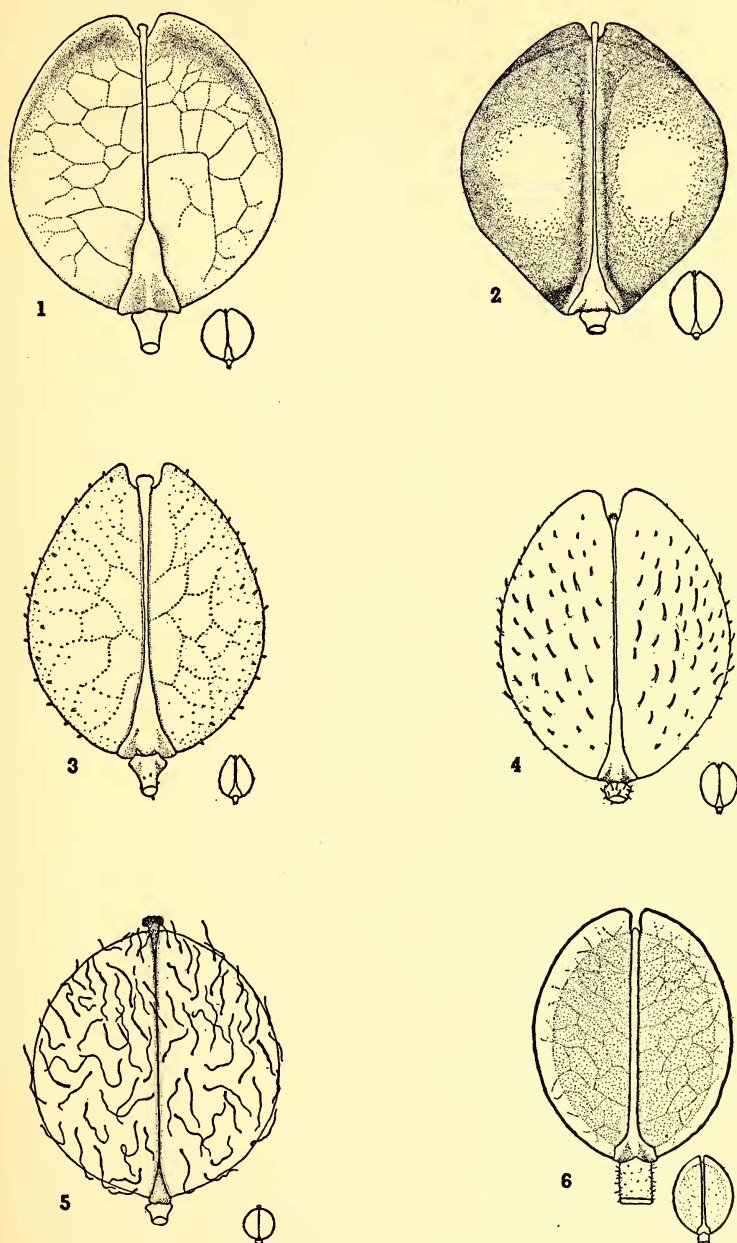


PLATE XV. United States species of *Lepidium*; upper surface of mature silicles. Small outline drawings $\times 2$; other drawings indefinitely enlarged. Fig. 1. *L. virginicum* L. Fig. 2. *L. perfoliatum* L. Fig. 3. *L. ramosissimum* Nelson. Fig. 4. *L. austrinum* Small. Fig. 5. *L. latifolium* L. Fig. 6. *L. nitidum* Nutt.

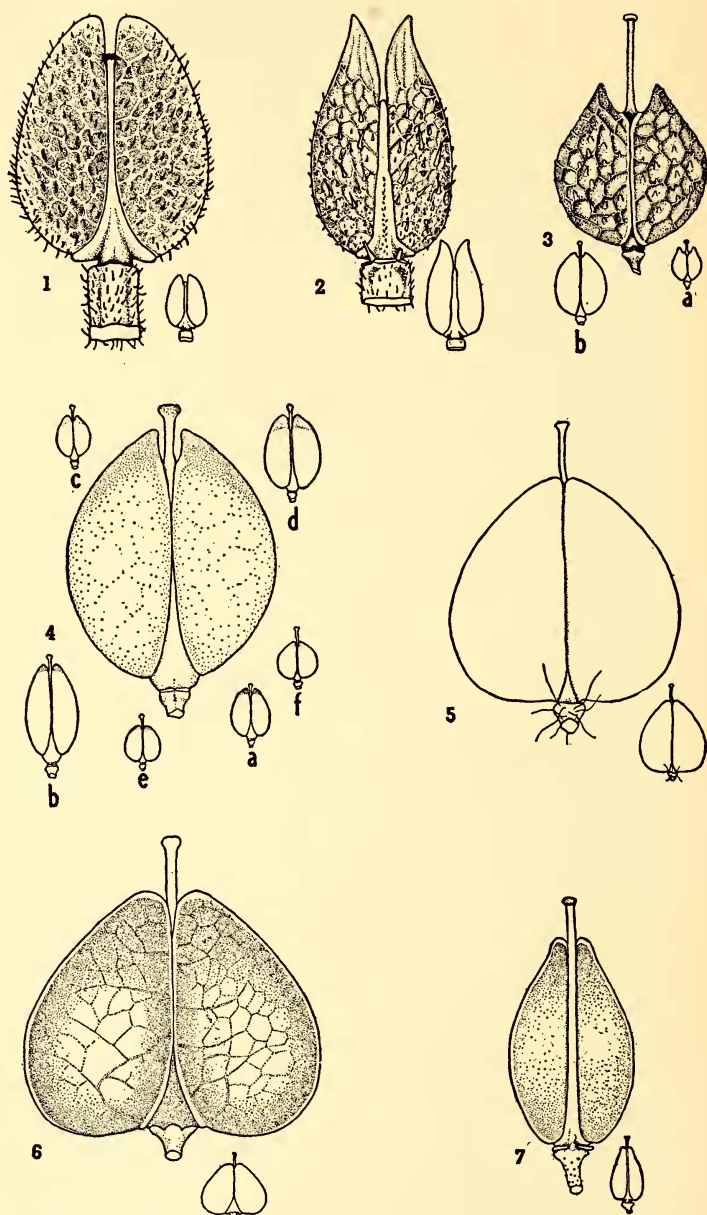


PLATE XVI. United States species of *Lepidium*; upper surface of mature silicles (except Fig. 2.). Small outline drawings $\times 2$; other drawings indefinitely enlarged. Fig. 1. *L. dictyotum* Gray var. *typicum*. Fig. 2. *L. latipes* Hook. (lower surface). Figs. 3, 3a. *L. flavum* Torr. var. *typicum*. Fig. 3b. *L. flavum* var. *felipense* C. L. Hitchcock. Figs. 4, 4a, 4b. *L. montanum* Nutt. var. *Jonesii* (Rydb.) C. L. Hitchcock. Fig. 4c. *L. montanum* var. *typicum* f. *wyomingense* C. L. Hitchcock. Fig. 4d. *L. montanum* var. *integrifolium* (Nutt.) C. L. Hitchcock. Fig. 4e. *L. montanum* var. *canescens* (Thell.) C. L. Hitchcock. Fig. 4f. *L. montanum* var. *alpinum* Wats. Fig. 5. *L. Jaredii* Brandege. Fig. 6. *L. Draba* L. Fig. 7. *L. nanum* Wats.

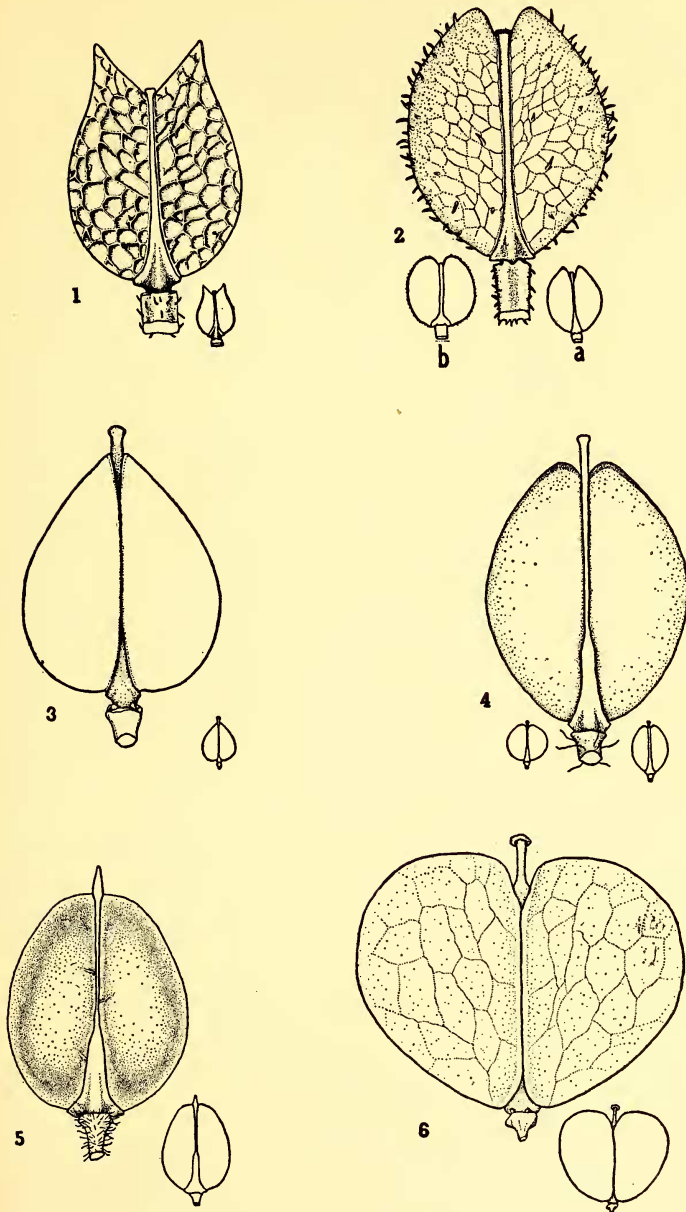


PLATE XVII. United States species of *Lepidium*; upper surface of mature silicles. Small outline drawings $\times 2$; other drawings indefinitely enlarged. Fig. 1. *L. oxycarpum* Torr. and Gray. Figs. 2, 2a. *L. lasiocarpum* Nutt. var. *typicum*. Fig. 2b. *L. lasiocarpum* var. *rotundum* C. L. Hitchcock. Fig. 3. *L. graminifolium* L. Fig. 4. *L. Thurberi* Wooton. Fig. 5. *L. campestre* (L.) R. Br. Fig. 6. *L. Fremontii* Wats.

Lepidium Thurberi can easily be distinguished from *L. montanum*, its nearest relative, by the pubescence. In the former species the hairs are plainly visible to the unaided eye as they are often 0.5–1 mm. long. Although the fruits are very similar, those of *L. Thurberi* are more nearly rhombic and the styles average shorter.

University of Montana,
Missoula, March, 1936.

VELEZIA RIGIDA IN THE SIERRA NEVADA FOOTHILLS

CHARLES M. BELSHAW

Velezia rigida L., a low wiry annual native of the Mediterranean region, is well established in the vicinity of La Grange on warm south-facing slopes of the Tuolumne River watershed. It was collected by the writer approximately twenty-four miles northwest of La Grange, on the bank of Hunter Creek, one and one-half miles northwest of Buchanan, Tuolumne County (elevation 2300 feet, slope south 58 per cent, October 23, 1935, *Belshaw 152*). Here the species has become dominant to the exclusion of low annual grasses which usually occupy this ecological niche. A less favored habitat is open ground in woodland or chaparral.

An additional collection was made between Cool and Pilot Hill, three miles southeast of Auburn, Eldorado County (May 30, 1935, *Belshaw 945*). The species was growing in moist sandy alluvium at an elevation of 1400 feet (Upper Sonoran Zone) associated with *Quercus douglasii* H. & A. and annual grasses. No plants were seen with stems trailing.

Other known collections from California are: Humboldt Bay (without date) *H. P. Chandler*; Hupa Indian Reservation, altitude 500 feet, June, 1901, *H. P. Chandler 1306*; Supply Creek, Hupa Valley, Humboldt County, July 25, 1902, *Jepson 2120*; and Tuolumne River near La Grange, Stanislaus County, July 2, 1896, *Jepson*.

California Forest Survey,
California Forest and Range Experiment Station,
July 23, 1935.

NOTES AND NEWS

"The Genus *Eriogonum*, A Preliminary Study Based on Geographic Distribution" by Susan G. Stokes of San Diego High School was published privately and appeared June first. It may be obtained from Mr. J. T. Howell of the California Academy of Sciences, San Francisco. Price \$2.50.

While enroute to Sonora, Mexico, for field studies, Dr. Forrest Shreve and Dr. David Keck stopped in San Diego on March second. Dr. Shreve spoke at the State College on "The Study of the Desert."